A Sting in the Tale Dave Goulson

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About the Book

Dave Goulson has always been obsessed with wildlife, from his childhood menagerie of exotic pets and dabbling in experimental taxidermy to his groundbreaking research into the mysterious ways of the bumblebee and his mission to protect our rarest bees.

Once commonly found in the marshes of Kent, the short-haired bumblebee now only exists in the wilds of New Zealand, the descendants of a few queen bees shipped over in the nineteenth century. Dave Goulson's passionate drive to reintroduce it to its native land is one of the highlights of a book that includes exclusive research into these curious creatures, history's relationship with the bumblebee and advice on how to protect it for all time.

One of the UK's most respected conservationists and the founder of the Bumblebee Conservation Trust, Goulson combines Gerald Durrell-esque tales of a child's growing passion for nature with a deep insight into the crucial importance of the bumblebee. He details the minutiae of life in their nests, sharing fascinating research into the effects intensive farming has had on our bee populations and on the potential dangers if we are to continue down this path.

About the Author

Dave Goulson studied biology at Oxford University and is now Professor of Biological Sciences at the University of Sussex. He has published over 190 scientific articles on bees, butterflies and other insects. He founded the Bumblebee Conservation Trust in 2006, whose groundbreaking conservation work won the Heritage Lottery Award for best Environmental Project. He was made ‘Social Innovator of the Year’ by the Biology and Biotechnology Research Council in 2010.

For Seth, my youngest son.
May there always be a flowery meadow
and the sight and sound of buzzing bees for him to enjoy.

A STING IN THE TALE

Dave Goulson

JONATHAN CAPE
LONDON

The last word in ignorance is the man who says of an animal or plant, 'What good is it?' If the biota, in the course of aeons, has built something we like but do not understand, then who but a fool would discard seemingly useless parts? To keep every cog and wheel is the first precaution of intelligent tinkering.

Aldo Leopold

Prologue

My interest in bumblebees and other insects dates back to the age of seven, when my family and I moved from a small semi-detached house on the edge of Birmingham's urban sprawl to a little village called Edgmond in Shropshire. My father had been brought up close by in the market town of Newport and, being a schoolteacher, he was keen that his two sons should get a good education. Newport had, and still has, a fine grammar school, the school which my father had attended and to which he hoped my brother and I would go, provided we could pass the entrance exam.

At seven I didn't much care about school, but I loved our new house. In hindsight it was rather ugly, with a rash of stone cladding and a hideous flat-roofed extension, but small boys don't worry about such things. The house was detached, and it had a much bigger garden than I was used to. There were large flower borders, apple and damson trees, a pond, two ancient wooden sheds full of cobwebs and vast spiders which gave me the willies, and enough room for my father to grow a fine patch of vegetables. Better still, the house was opposite open countryside. I had only to cross the village high street and jump a stone wall, and I was in a huge field, with a magnificent horse chestnut tree to climb. A grumpy dappled grey horse often stood in the tree's shade on hot summer's days, twitching its tail at the flies, and was prone to biting and kicking. In spring, the tree would teem with bumblebees visiting its pyramids of cream and pink flowers. The supply of bees meant that the

flowers turned into plentiful conkers in late summer with which my friends and I would bomb passersby while hidden in the dense green canopy of the treetop.

My father wasn't too interested in flowers; he allowed me to plant what I liked, so I put in lavender, buddleia and catmint to attract bumblebees and butterflies. I trained a honeysuckle up one of the old sheds to feed moths, and planted a male pussy willow to provide the bees with early spring food. I built a large rockery out of old bricks which I scavenged from a dilapidated farm building across the fields, carrying them home in a knapsack. I left spaces at the bottom for the bumblebees to nest in, and planted the top with bird's-foot trefoil to provide flowers for bees and tasty leaves for caterpillars of the common blue butterfly. I dug a bigger pond, and stocked it with newts, sticklebacks and all manner of other beasts from the local canal.

I have no idea where this all came from. My father was a history teacher who, to this day, can recite the chronology of English monarchs since William the Conqueror, with dates, and discern the age of a building from the shape of its windows or finials. Give him a bumblebee, however, and he hasn't a clue (although I have tried to educate him). My mother was a sports teacher, great with a rounders bat or a tennis racquet and fiercely competitive, but with no interest whatsoever in nature. She was not at all keen on creepy-crawlies of any description, and absolutely terrified of spiders. So I had to teach myself, using a range of identification books and natural history guides that my parents happily supplied me with; my father loved books of any sort.

The only adult whom I can recall actively encouraging my interests was a primary school teacher, the formidable Miss Scott. She was short and stocky, with thick brown curly hair and, having a short fuse, was prone to barking commands and reprimands. My classmates and I were initially terrified – our previous teachers had been the

sweet, gentle types that one imagines primary schoolteachers to be. But before long we realised that there was a merry glint in her eye, and that the stern front she presented was just that: a front. What is more, she loved to take us out looking for beasts and bugs; she showed us how to identify trees from the leaves, and how to place pitfall traps to catch beetles. She was particularly keen on pond-dipping. In my memory it seems that we went pond-dipping in the local canal every day (and it was always sunny). Our classroom soon filled with jam jars containing tadpoles, pond-skaters, ferocious dragonfly larvae, great diving beetles, millipedes, spiders and much else besides. The dragonfly larva was my particular favourite – this ugly, dumpy brown creature would lurk motionless at the bottom of the jar, waiting to be fed. Each day we would drop in a tadpole or a worm and watch, ghoulishly, as the dragonfly larva's face unfolded into telescopic pincers with which it snatched and devoured its unsuspecting prey.

By the following spring, my efforts to encourage wildlife in the garden were really beginning to pay off. I noticed huge queen bumblebees, fresh from hibernation, feeding on the pussy willow and lungwort. These bees had been asleep for seven months or so, since the previous July, so the spring feast I had grown for them was particularly welcome. Once satiated, the queens would fly low over the ground, searching for a suitable hole in which to nest. I noticed a white-tailed bumblebee queen investigating the space under one of the garden sheds, and she must have liked it, for weeks later her smaller workers appeared, flying out to gather food and coming back, half an hour later, with enormous balls of bright yellow pollen on their legs. I sat and watched them for hours, and noticed the nest traffic becoming busier and busier as the season went on and the number of workers rapidly grew. No bees ever

showed any interest in nesting in my purpose-made bumblebee nest chambers beneath the rockery.

As summer approached, the garden began to swarm with wildlife. The buddleia was covered with small tortoiseshells, peacock butterflies, large and small whites, hoverflies and bumblebees. Pond-skaters and whirligig beetles fought territorial battles on the surface of my new pond, and an emperor dragonfly took up residence, perching on a tall purple loosestrife growing in the pond margin. It would zoom out to catch other flying insects to eat, snatching them mid-air with its bristly legs, and chase away any other dragonflies that tried to move in on its patch. I remain to this day amazed at how quickly wildlife appears in a garden if given just a little encouragement.

On one occasion, after a heavy summer rainstorm, I found a number of bedraggled bumblebees clinging to my buddleia, and decided to dry them out. Unfortunately for the bees I was, perhaps, a bit too young to have a good grasp of the practicalities. With hindsight, finding my mum’s hairdryer and giving them a gentle blow-dry might have been the most sensible option. Instead, I laid the torpid bees on the hotplate of the electric cooker, covered them in a layer of tissue paper, and turned the hotplate on to low. Being young I got bored of waiting for them to warm up and wandered off to feed my vicious little gerbils. Sadly, my attention did not return to the bees until I noticed the smoke. The tissue paper had caught fire and the poor bees had been frazzled. I felt terrible. My first foray into bumblebee conservation was a catastrophic disaster. This did not bode well for the future – but at least I had learned that there is an upper temperature limit beyond which bumblebees are not happy. As we shall see later, a similar principle explains why there are few bumblebees in Spain.

I was an avid fan of Gerald Durrell’s books, particularly those about his childhood growing up in Corfu, collecting all sorts of exciting animals and keeping them in his

bedroom. He had owls, snakes and turtles – and, what is more, he never had to go to school (he was taught at home by an eccentric tutor who was more interested in swordfighting than algebra). He even had a donkey to carry all his collecting nets and jam jars. Deeply envious, I did my best to follow in his footsteps, making do with the slightly more mundane fauna of Shropshire. I badgered my poor parents into letting me keep an array of pets, starting with guinea pigs, rabbits, hamsters and mice. My brother and I mercilessly wore our parents down until they agreed to let us have a dog, a lovely black Labrador-cross puppy that, with a total failure of imagination, we named Spot after the white spot on her back. As she grew, this spot rapidly disappeared, which made her name the cause of occasional confusion. Nonetheless, she was an incredibly soft and tolerant dog who put up with our endless teasing and was a great companion in our romps in the countryside.

After the novelty of my traditional pets wore off, I moved on to more exotic tropical fish, leopard frogs, red-eared terrapins, garter snakes and anolis lizards. I had my own bedroom with a view of the chestnut tree, and I filled this room with home-made boxes and tanks from which all but the most dim-witted creatures invariably escaped. My garter snakes spent more time out of their tank than in it. In desperation I tried using sticky tape to hold the lid down, with unfortunate consequences. One of the snakes still managed to push up the lid, but then became stuck to the tape and in its attempts to disentangle itself became hopelessly wrapped up in a ball of tape; it took me hours to tease it apart. I resigned myself to regular hunts for escapees, and it is quite possible that a garter snake is, to this day, living somewhere under the floorboards of that house.

For one birthday, I was given a small aviary for the garden which I stocked with budgerigars and a pair of beautiful Chinese painted quails. As an adult I find keeping

birds in cages cruel (especially large parrots in small cages indoors) but as a boy I wasn't worried by such sensibilities. I loved sitting in the aviary with the birds flying about my head. Before long the budgies started to breed, and I was able to supplement my pocket money by selling the surplus stock (the quails also laid plenty of eggs but they never seemed to hatch). Baby budgies are spectacularly ugly bald creatures with oversized heads. Normally they rapidly grow feathers and become rather more cute, but one poor chick seemed unable to, and as it grew remained almost entirely bald. Eventually it attempted to fledge from the nest and leapt out, falling like a stone to the floor. Undeterred, it clambered back up the netting using its beak and feet and joined the other budgies on the highest perch. Every now and then the poor little mite would gamely hurl itself into the air, flapping its tiny pink arms, and thud once again to the floor. It lived for six months or so but stood little chance when winter arrived.

My charges had a worryingly high mortality rate. One Sunday morning, my mother was in the kitchen rustling up one of her legendary pies (she is an excellent but very traditional cook, always serving up meaty dishes with potatoes and vegetables, followed by a hefty hot pudding such as a fruit crumble or spotted dick with custard). I must have been at a loose end and getting in her way, so she pointed out that the fish tank in my bedroom was in dire need of a clean – the glass had become green with algae, so that the fish were barely visible. A little while later I was dutifully scrubbing the glass inside the tank, my arm immersed in the warm water, when my mother called up, 'Dave … What's burning? You aren't lighting matches again are you?' Before starting to scrub, I had lifted out the electric heater, encased in its glass waterproof tube, and laid it on a wooden cupboard to one side. It hadn't occurred to me to unplug it, and not being in water it had become hot and was burning into the top of the cupboard. (I never

fathomed how my mother was able to smell burning so quickly and from such a long way away.) Without thinking, I lifted the heater by its cable and tossed it into the tank. Of course, very hot glass and cool water are not an ideal combination, and the heater tube shattered with a bang, exposing the electrical element to the water and electrocuting all of my fish. They quivered and spasmed in the water (thankfully I didn't shove my hand in the tank to pull the heater back out), and by the time I had pulled the plug from the socket they were all very much dead.

There were many other such disasters. Perhaps the most traumatic involved my quails. These lovely little creatures scurried around on the floor of the aviary scratching for food. The male had beautiful black and white markings on his face, and a rather splendid plume on top of his head. The female was more drab but delicately marked with dark speckles. They were inseparable, behaving as if glued together side by side, and often grooming one another. I preferred them to the budgies, which I had eventually concluded were decidedly raucous, uncouth and gaudy beasts (perhaps my view was coloured by the savage pecking they gave me whenever I had to handle them). Now, Shropshire is a cold county in winter, as my bald budgie discovered. It is a long way from the warming influence of the sea, and often records the coldest night-time temperatures in England. After one particularly cold night I went out in the early morning to feed the birds in the aviary, and was surprised to see the budgies attacking the quails. Both quails were struggling on the snowy ground, each with two or three budgies perched on them and tearing mercilessly at their feathers with their jaggedly pointed beaks. I rushed in and shooed the budgies away. The poor quails seemed unable to stand, but were very much alive. I picked them up, one in each hand, and took them indoors. On the kitchen floor, it became obvious what their problem was. Whenever they tried to stand, they

simply toppled over. Closer inspection revealed that they had no toes; they had both suffered from frostbite in the night, and their toes had simply dropped off. Their legs now ended in stumps, no use at all for standing up or walking. Distraught, I did not know what to do. In a flash of desperation, I tried to fashion them prosthetic feet from plasticine and matchsticks, but this was not a triumph so I laid the birds, still struggling to come to terms with their new prostheses, in a cardboard box with some food and went to school.

When I came home, the situation had not improved. The birds had not miraculously grown back their toes, or worked out how to use their new plasticine-and-matchstick feet. They were just lying there, looking a little more feeble. The harsh reality dawned: my quails were not going to get better. They could not be fixed. I had felt terribly guilty that my bald budgie had probably frozen to death, and it was clear that it would have been kinder to have given it a swift death. With this in mind, I decided that there was only one thing for it.

I cannot remember why I decided against enlisting the help of my parents to take the poor birds to the vet at this point. A quick lethal injection would have been the most sensible solution, but small boys are not logical. Instead, I got my dad’s axe from the shed. It was a full-sized, grown-up’s axe, way too big for me at the time. I took the birds to the bottom of the garden, and laid them next to each other on the grass. I figured that it would be best to deal with them both at once, rather than dealing with one while the other looked on. They lay there, looking up at me, their eyes still bright, their stumps kicking ineffectually. I hefted the axe on to my back and took a huge swing. The head of the axe buried itself in the lawn, just in front of the beaks of the startled but otherwise unharmed birds. I had been aiming to sever both their heads in one blow. I eventually managed to pull the axe out of the ground, and tried again.

Success! More or less. I didn't so much sever the heads as chop both birds clean in half, but the end result was much the same. I dug a small hole next to my rockery and laid them to rest, roughly reassembled and side by side, as they had spent their lives.

I could go on. I could mention the awful fate of my axolotl, or my botched attempt to perform corrective surgery on a badly injured rook. Suffice it to say that being one of my pets was a dangerous business.

As well as amassing a diverse array of living creatures, I became an avid collector. I am embarrassed to admit that this started with birds' eggs. In the 1970s in rural England this was a very common hobby for boys. Many of my friends collected eggs, and we would vie with one another to obtain unusual specimens. My father showed me how to blow the eggs; he had collected them himself as a boy, along the same hedgerows that I now searched. One grinds a tiny hole at each end by spinning a pin between one's fingers while pushing the tip against the shell. The idea is to then blow on one end, forcing the contents out through the opposite pinhole. Easy enough with a chicken's egg, but incredibly fiddly with the tiny white-and-brown-speckled egg of a wren. My prize specimen came from a mute swan. When out 'egging' along the local canal bank with my friends Les and Mark (or 'Butt' as we knew him, for reasons long forgotten), we spotted the egg lying in an abandoned nest in a reed bed near the opposite bank. The rest of them had long since hatched and the parents and cygnets were nowhere to be seen. Without hesitation we threw our jumpers and T-shirts off, knowing that the first to get there would win the prize. Butt and Les started peeling off their jeans, but I just leapt in half-clothed and beat them to it. The egg was putrid inside; when I pushed the pin into it a stream of creamy, lumpy goo erupted from the end, squirting into my face and smelling to high heaven. Blowing out the rest of the contents was a memorable

ordeal, which my long-suffering father helped me with in the end as I had turned green from the smell. The egg was eventually placed, still rather whiffy, in pride of place in the centre of my display case on my bedroom wall.

Modern readers will be horrified by all of this. Egg collectors are now only one small step above serial killers in the social hierarchy (in fact, I suppose in a sense they *are* serial killers, so fair enough). It is true that most of the eggs I collected were alive when I took them, unlike the swan's egg. I do not defend egg collecting; I certainly would not allow my three boys to do it. But I did learn an awful lot about natural history by spending my days hunting for eggs. We only ever took one from a nest, and did our best to disturb it as little as possible. This does not, of course, make it right. Collecting the eggs of extremely rare birds is clearly a heinous crime, and I am glad that I never managed to find anything particularly rare. But I sometimes think that we are poor at keeping perspective on our activities, and those of others. How many condemn egg collecting, for instance, while allowing their pet cat to roam unfettered? (Domestic cats kill millions of birds and small mammals each year.)

From eggs I moved on to collecting insects, starting with butterflies. My mother, bless her, was not keen on this – but I persuaded her that I would only take a male and female of each species, and could not do too much harm. To start my collection I bought a dead, dry but very beautiful tropical swallowtail from a butterfly farm in Dorset called Worldwide Butterflies. It arrived in a paper envelope inside a small cardboard box which I opened with great excitement. What I hadn't anticipated was that the specimen would not have been 'set', which is to say that its wings were folded shut, and it did not have a pin through it. I tried to open the wings, not understanding that this is impossible with a dry butterfly; they are incredibly brittle and delicate. The wings snapped off along with most of the

legs as I clumsily tried to arrange it in an attractive position. I was left with a very sad collection of body parts. Disheartened, I managed shortly afterwards to get hold of a second-hand book, *Studying Insects* by E. B. Ford, which explained where I had gone wrong. To pin and set a butterfly with the wings flat and beautifully symmetrical, as they are always displayed in museums, it must be freshly killed, or if it is dry it must first be ‘relaxed’ by putting it in a tin with moist tissue paper for a couple of days (no longer or it goes mouldy). When soft and damp the butterfly can be carefully pinned and arranged in whatever position is desired. Once it dries, it will remain fixed in position for ever, so long as it does not get damp again.

Studying Insects also explained how to make a killing jar by filling the bottom of a large jam jar with crushed laurel leaves; when crushed, the leaves release cyanide, which smells strongly and sweetly of marzipan (even knowing it was poisonous, I couldn’t resist having a good sniff every now and again). A few minutes inside the jar is enough to send a butterfly into a permanent sleep.

I also tried constructing a butterfly net from a wire coat hanger and a pair of my mum’s stockings, but this was hopeless, and without a net it was almost impossible to catch anything. Eventually, I discovered the address of a company named Watkins & Doncaster, based in Hawkhurst in Kent. They billed themselves as ‘suppliers of entomological equipment’. I wrote to them, and a few days later received their catalogue through the post.

This was a seminal moment in my life, a turning point from which I have never looked back.

I had just arrived home from a game of mini-rugby, so I guess I was eight years old. I was covered in mud, so I took the catalogue up to read in the bath. The Watkins & Doncaster catalogue was the most wonderful thing I had ever seen. Fat, it contained page after page of illustrations of the most amazing paraphernalia: insect nets, pond-

dipping nets, pillboxes, cages, tubes, magnifying glasses, malaise traps, microscopes, setting boards, moth traps, pooters, beautiful mahogany insect cabinets. At the end was a section on taxidermy, which contained such entrancing objects as a brain scoop, bone cutters, and a vast selection of glass eyes. I was transfixed, amazed. This was a whole new world. Moreover, there were obviously lots of other people out there like me! I wanted to buy more or less everything in the catalogue, but my pocket money placed severe limits on what I could afford. Nonetheless, my first purchase was a full-sized, professional kite net which cost me £16, a fortune to an eight-year-old boy, and I was immensely proud of it. It was nearly as tall as me, with a stout brass handle, a rigid metal frame and a soft and very deep black net. With this, I felt I could catch almost anything.

My butterfly collection slowly grew, as did my collection of books about butterflies and other insects. My first catch was a terribly tatty painted lady, her wings torn from the long migration from Morocco. I soon added a meadow brown, large and small whites, a gatekeeper, speckled wood, small tortoiseshell, red admirals, common blue and peacock. The beauty of these creatures takes my breath away to this day; I still have the specimens, in the top drawer of an insect cabinet which I was only able to afford three decades later. I also learned to search for the eggs and caterpillars, which meant finding out what the caterpillars ate, and also how to identify the plants. With a little care it is easy to rear caterpillars into adult butterflies; that way one gets beautiful fresh specimens to add to one’s collection, and the surplus can be released. I picked up an enormous amount of knowledge.

From butterflies I expanded my interests to include moths. Most moths fly at night, and to catch them there are two popular approaches. One is to go ‘sugaring’. This involves boiling up a fantastic brew of black treacle, beer,

brown sugar, vanilla essence, pear drops, rum or brandy, and pretty much anything else one fancies so long as it adds to the heady aroma. Every moth collector has his own highly secret recipe, or so it seems. Whatever the mixture, the end result should be a thick gloopy liquid that smells so strong that it makes one's eyes water at fifty paces. This is then painted at dusk on to fence posts or tree trunks. The idea is that moths find the smell irresistible and are drawn to land and drink the sugary syrup; they become hopelessly intoxicated by the alcohol, and then sit there in a stupor ready to be snatched up by the eager moth collector. I stank out the house brewing up various versions of this, and got through much of my mum's sugar, treacle and food flavourings and a lot of my dad's alcohol. The end results were disappointing. Earwigs appeared to be the only creatures that were consistently attracted; I sometimes had hundreds of them swarming over my sugar patches, getting stuck in the goo as they climbed over each other in their feeding frenzy. Hardly a single moth appeared. I also found it slightly nerve-racking wandering around the local fields at night on my own (not least because my father regularly let me and my brother stay up on Saturday nights to watch Hammer House of Horror movies, and my overactive imagination conjured up a vampire in every shadow). On one occasion I was checking the sugar patch on a large ash tree when a tawny owl decided to screech just above me. Although I knew it was an owl, I had great difficulty resisting the temptation to sprint straight back home, and my heart didn't stop hammering in my chest for a good ten minutes.

There is an alternative and more convenient way to attract moths: a light trap. *Studying Insects* explained the principle: moths are attracted to candles and any other light sources. Hence this sort of moth trap involves a bright light hung above a container a bit like a lobster pot. The moths are drawn to the light, blunder into it and fall down

through a funnel into a large dark container usually stuffed with egg cartons, which they seem to like to sit on. This sounded much easier and less scary than traipsing round the fields in the dark with a bucket of treacle, so I decided to give it a go.

I rigged up a 100-watt light bulb over a home-made cardboard funnel, itself sitting on a plastic bucket, turned it on before going to bed and eagerly awaited the morning. I dashed down at first light to survey my catch. Disappointment: nothing but a couple of wasps and a tiny brown 'micro' moth as I now know they are called. I tried for a couple of weeks, but with little success. After some research, I gathered that ultraviolet light was best for attracting moths. By chance my mother had a rather odd and old-fashioned heat lamp used to treat muscular injuries, something she had possessed ever since she was in college training to be a sports teacher. It resembled an enormous Anglepoise lamp, but with two very fancy-looking bulbs, one of which produced infrared heat, and the other ultraviolet light. To this day I've no idea why anyone thought it was a good idea to give injured body parts a jolly good tan as well as a blast of heat; presumably skin cancer was not well understood at the time. Anyway, I'd never seen my mother using it (probably a good thing) and I figured she wouldn't mind if it was cannibalised in the name of scientific research. The only problem was that it wasn't possible to turn on the ultraviolet lamp without the heater element. Undeterred, I rigged up both bulbs next to one another above my home-made bucket trap, and left it on for the night. The next morning, I came down to a qualified success. The UV lamp had attracted a lot of moths, but unfortunately they had been frazzled to a crisp by the heat lamp: my trap was full of charred moth bodies. Not quite what I was after. In frustration, I attempted to rewire the lamps to separate the two bulbs. I don't think I had started physics at school by that age (I was about nine

years old), so this was inevitably something of a long shot. When I flicked the modified light on, this time with only the UV bulb connected to the power, there was a loud bang. The UV bulb shattered. I reassembled Mother's lamp and put it back in the cupboard, hoping that she would never notice. Of course she did. It was many years before I saved up enough money to buy a proper 'Robinson's mercury vapour moth trap' (an absolutely marvellous device, by the way, which lights up the entire neighbourhood with an eerie glow and attracts moths from miles away). In the meantime, my moth collection grew rather slowly.

I was not fully aware of it at the time, but my childhood coincided with a catastrophic period in the history of the British countryside, at least from the point of view of a butterfly or bumblebee. Shropshire may sound idyllic, but this is misleading. It was and is a relatively rural, green and pleasant part of Britain, but it is not the haven for wildlife that it might once have been. I moved there in 1972, and left for university in 1984. At weekends I would often walk with my friends to the Shropshire Union Canal about two miles away across the countryside, searching the hedges for birds' nests along the way. When I started, this walk involved crossing fifteen fields, each bounded by a hedge. By the time I left for university, the walk involved crossing one field – a huge one. The hedges in which I used to search for birds' eggs had been ripped out, one by one. A large part of the canal itself had been filled in, covered in topsoil, and was now just a part of the arable expanse. Where once a bumblebee would have been able to find brambles in the hedges, cowslips in the hedge banks and marsh woundwort on the sides of the canal, there was now only a sea of cereals, a monoculture stretching across the landscape. These changes occurred almost everywhere in lowland Britain, sweeping across Western Europe.

These changes drove the decline and, in some cases, the extinction of many creatures, and our countryside is a

much poorer place because of it. But the battle is not lost. We have slowly, tentatively, started to find ways to undo the damage. Scientific studies are revealing how best to combine efficient farming with looking after the countryside. A range of payments is available to farmers to support them in encouraging wildlife. The British have a peculiar and unique love of the countryside and the animals and plants which inhabit it, and there is a huge groundswell of support for conservation. To tap into this, in 2006 I launched the Bumblebee Conservation Trust, a charity devoted to saving our bumblebees, and to my delight the Trust has flourished. It now has over 8,000 paid-up members, and is creating flower-rich habitat for bumblebees across Britain from Kent to Pembrokeshire to Caithness. Most of our wildlife clings on, and with our help it can recover. Sometimes even species which have been lost entirely might one day return. But that is the subject of Chapter 1…

CHAPTER ONE

The Short-haired Bumblebee

In the 1870s, New Zealand farmers found that the red clover which they had imported from Britain, as a fodder crop for horses and cattle, did not set much seed. As a result, they found themselves having to continually import more seed from Europe at considerable expense, rather than collecting and sowing their own. In the end a solicitor named R. W. Fereday worked out the cause of the problem. Fereday had emigrated to New Zealand in 1869 and, aside from his legal work, was a keen entomologist with a particular interest in small moths. It was Fereday who realised, while staying on his brother's farm, that the problem lay in the absence of the bumblebees which normally pollinated the clover back in Britain. The problem was taken up by Frank Buckland, Her Majesty's Inspector of Fisheries at the time, whose remit seems to have extended well beyond fish. He wrote back to England with a request for bumblebees to be sent on the steamships which regularly plied between Britain and New Zealand. The first, rather ill-thought out, attempt to do so involved a Dr Featherston digging up two carder bumblebee nests in late summer and sending them to the Honourable John Hall of Plymouth, New Zealand, in 1875. They arrived in January and, inevitably, were all dead. Bumblebee nests naturally die out in September, and in any case there were no flowers

on the ship for them to feed on, so this scheme was doomed from the start.

Eight years later the idea was revived with rather more competence. A Mr S. G. Farr, secretary of the Canterbury Acclimatisation Society (of whom more later), contacted Thomas Nottidge, a banker from Maidstone in Kent, asking for more bumblebees to be sent. (They also asked him for a few hedgehogs while he was at it – as you do.) So it was that, in the autumn of 1884, Nottidge offered a bounty to farm labourers for every hibernating bumblebee queen that they could find. Hand digging, clearing and widening of ditches was a common autumn and winter practice on arable farms when there wasn't much else to keep farm labourers busy, and these labourers often turned up the plump hibernating queens as they dug, suggesting that queen bees particularly like to hibernate in ditch banks. As a result, a total of 282 queens were obtained and placed on the SS *Tongariro*, one of the first steamships to be built with a refrigeration unit. This was essential as the hibernating queens would otherwise have become too warm when crossing the equator, and would have woken up and quickly died. The *Tongariro* left London in December 1884 and arrived in Christchurch on 8 January 1885 (high summer in New Zealand). When they were warmed up, forty-eight queens proved to still be alive. They were fed with honey and flew away. A further consignment of 260 queens was sent that same January on a sister ship, the SS *Aorangi*, and arrived on 5 February. Of these, forty-nine were still alive and were released.

We have no idea what species of bumblebee these ninety-seven queens belonged to, or how many survived long enough to build a nest and produce offspring. What we do know is that some thrived in their new home for, by the summer of 1886, bumblebees were seen up to 100 miles south of Christchurch. Indeed, by 1892 bumblebees had

become so common in some areas that honeybee keepers feared they might become a pest.

British bumblebees flourish in New Zealand to this day. On their long boat trip they also left behind many of the diseases and parasites that attack them in their native land, which probably helped considerably. The species that survived are an odd selection. We might have expected them to be the most common Kent species, but either our most common species were not included or they failed to survive. The four now found in New Zealand are the buff-tailed bumblebee, the garden bumblebee, the ruderal bumblebee and the short-haired bumblebee. Of these, the buff-tailed is by far the most common – they are everywhere, from the gardens and parks of Christchurch to the spectacular fjords of Milford Sound, where I have seen them feeding on the flowers of the gigantic New Zealand flax. The short-haired bumblebee is the least common, but if you know where to look, they can still be found in central South Island.

Sadly, two of these species have not fared so well in the UK. The ruderal bumblebee was once known as the ‘large garden bumblebee’ because it was a familiar sight in gardens throughout much of England. Nowadays the ruderal bumblebee is an exceedingly rare creature, found only in a few places in the East Midlands and East Anglia. The short-haired bumblebee has fared even worse. One hundred years ago they were common in the south and east of England, but during the second half of the twentieth century their numbers plummeted. By the 1980s they were known only in a handful of places, and one by one, those populations disappeared. The last individual was caught near Dungeness in 1988; it fell into a pitfall trap used to monitor beetles and drowned. No one has seen any since.

Of course you will have worked out why these bees disappeared. It happened while I was growing up. When I was born in 1965 the short-haired bumblebee was still

quite widespread, although not as far north and west as Shropshire. By the time I went to university in 1984 it was nearly extinct. I never saw one before they vanished.

Here's why: it's Adolf Hitler's fault. To be absolutely fair, it wasn't entirely his fault, but he has to carry some of the blame. One hundred years ago, farming was not mechanised. Without mechanisation, fields tended to be small. Farmers depended on horses for power, and horses love to eat clover, so most farmers grew clover. Bees also love clover. Both the horses and other farm livestock needed hay for the winter, so most farmers had hay meadows. These were permanent features of the farm, cut once or twice a year, and sometimes grazed a little in the milder winter months. Artificial fertilisers weren't available, so apart from a bit of animal dung the meadows were not fertilised. In the low-nutrient soils of hay meadows, wild flowers flourished, particularly those with symbiotic root bacteria that could trap nitrogen from the air and so didn't need nutrient-rich soil. The main family that can do this is that of the legumes: vetches, trefoils and clovers (and also our garden peas and beans). Bees love them all.

Arable crops need fertile soils. The traditional way to maintain soil fertility was to grow crops in rotation. For many centuries, European farmers used a three-year rotation of rye or wheat followed by oats or barley, then letting the field lie fallow in the third year. In the eighteenth century, a British agriculturalist named Charles Townshend promoted a four-year rotation, using wheat, turnips, barley and clover in succession. The nitrogen fixed by the clover boosted soil fertility in the following years, increasing yields, and the scheme was widely adopted. So, imagine Britain a hundred years ago; a patchwork of small fields, cereals and root crops intermixed with clover leys and permanent hay meadows. No artificial fertilisers, no pesticides. Lots and lots of happy bees.