

preface

WHEN I WAS WORKING ON THIS BOOK, in 1999, people often asked why I wanted to spend my time writing about something as repulsive as a cockroach.

The first reason was, of course, simply a desire to learn about the natural history of such a ubiquitous insect, but other things also drew me. One was that humans forget the vast majority of moments from their daily lives, whole days, weeks, months go by about which we can remember nothing, but most Westerners will always remember the encounters they've had with cockroaches. The "civilized" European or North American has such a visceral distaste for the cockroach that a meeting with one is likely to be burned into his or her memory bank. This meant that just about everyone had a good, skin-crawling cockroach story to tell.

Another draw to the subject was the long, long road that humans and cockroaches have traveled together. They were here waiting for us when our species arose, and we have never separated from them. If, and when, we disappear from the earth, it is improbable that cockroaches will accompany us into extinction. At least not right away. They are considerably hardier than we are, with a much more viable design for survival.

Yet another reason I liked writing about cockroaches was that what I wrote would stay relevant for a long time. Books often come with a kind of use-by date. Many subjects are ephemeral, they change substantially over the course of a couple of decades. Readers' tastes change, and some subjects lose their attraction. In other cases, discoveries are made that render previous thinking and writing on the subject outmoded. None of this applies to cockroaches. What's true about them today is likely to be true tomorrow, and next year, and next millennium, since they've been around, basically unchanged, for 3.5 million years. That's more than ten times as old as the earliest human remains. Not everything in this book has stayed the same since I wrote it, but all the basic stuff about cockroaches is unchanged. Cockroaches keep their heads down, and can eat just about anything, a couple of great survival strategies. They are not likely to disappear, or even to change much, anytime soon. A minor genetic mutation here or there, perhaps, but the nuts and bolts of their natural history will stay the same.

What *has* changed over the past couple of decades is my life and those places in it where cockroaches once thrived. The locations I wrote about are not the same now as they were then, nor am I, but overall the world is pretty much as it was then. If peace has come to one place, war has erupted in another, and if my bank account is bigger than it was then, my knees are weaker.

A few minor changes about some of the subjects touched on in this book need noting: the Minnesota company H. B. Fuller has stopped selling addictive shoe glue to Latin American markets (street children who are addicted to the toluene in the glue have no trouble finding other brands that will do just as well, and are still, literally, huffing their brains out); the New York City Housing Authority now uses more gels than sprays to combat roaches in public housing; the Environmental Protection Agency tightened its regulations regarding the testing of pesticides on human beings in 2013; and the wonderful cockroach researcher Lou Roth passed away in June 2003. Other things, unfortunately, remain unchanged: young women still die violently in disproportionately high numbers in Ciudad Juárez;

a permanent peace agreement has yet to be signed in the Western Sahara; and the rate of asthma among poor children exposed to cockroach waste continues to rise.

Roach investigation is ongoing in many places: research on controlling the movement of roaches remotely to help locate survivors after earthquakes continues at places like North Carolina State University. A hardy cockroach called *P. japonica*, previously only seen in the Far East, hitched a ride to Manhattan last year and may be settling in near the High Line park. And, scientists continue to use cockroaches as subjects in studying topics as various as the connection between learning and time of day (this at Vanderbilt University) and DNA mapping (e.g., the National Cockroach Project at Rockefeller University, which used citizen scientists to gather data from 2004 to 2012). Reviewing preliminary data from that project, a senior research associate named Mark Stoekle commented, "This is a window into cockroach society, and it is very much like our own."

Some minor changes have also occurred in the relationship of *Homo sapiens* to cockroaches. Continued funding for arms research has produced a steady flow of more sophisticated weapons against roaches, but often when something is found that works initially, it loses effectiveness over the course of a few years, as cockroaches mutate and develop resistance to the new product. The uneasy coexistence between humans and roaches, with its frequent skirmishes, continues unabated, as it has for millennia.

In places where spending money to exterminate roaches is unthinkable because there's barely enough, or sometimes not enough, to pay for food and shelter, coexistence with cockroaches is obligatory. In developed countries, where household budgets are high enough to allow for extermination measures, sprays and powders are often used because they are cheaper than gel baits. However, professional exterminators in developed countries have moved almost exclusively to gels as they are less noxious to humans and more efficient.

An improvement in the weapons we use against cockroaches has not tilted the battle toward us. When a more effective

roach killer is developed, the targeted species often mutates remarkably quickly to combat the noxious effects. Over the course of only five years, a strain of German cockroaches in Florida developed an aversion to the glucose that previously had been used to attract them to a poisonous bait. Researchers at Michigan State University have found another strain with a mutated gene giving it a high “knock-down resistance” to pyrethroid insecticides. An article in the October 2013 *Journal of Economic Entomology* reported that still other strains of German cockroaches, collected in the field, were found to have developed resistance to many classes of insecticides, including chlorinated hydrocarbons, organophosphates, carbamates, pyrethroids, phenylpyrazoles, and oxadiazines. The authors concluded: “Insecticide resistance has become a major problem for the pest management industry.”

As if this ability to mutate rapidly in response to various insecticides was not enough bad news for fastidious folks, the weapons we use against cockroaches have often proven to be more harmful to us than to the bugs. For instance, recent research has shown that exposure of women in the third trimester of pregnancy to some of the standard ingredients used in pyrethroid insecticides can result in mental developmental delays for a child after birth. Others classes of roach killers are no safer: organophosphates and N-methyl carbamates also have a potential to harm the nervous systems of children. Regardless of the class of insecticide, it is designed to disrupt the roach’s neurological system and disable its vital organs. It only makes sense to avoid contact with something capable of doing that to anything as hardy as a cockroach.

Sprays, gels, bug bombs, and poisons have not moved us all that far ahead of the ancient Egyptians who prayed to the ram-headed god Khnum for protection against cockroaches thousands of years ago; or the beleaguered John Smith writing from the Virginia colony in 1624: “A certaine India Bug, called by the Spaniards a caca-roche, the which creeping into Chests they eat and defile with their ill-sented dung.”

Human beings are pretty much as besieged by roaches now

as we were then, part of a larger struggle against the insect kingdom, a battle in which we have been engaged since making our appearance on this planet. As if to confirm that any victories we may achieve in the bug wars will prove temporary, the bedbug has made a tremendous comeback in the Western world over the past two decades. This has reversed a steep decline in the bedbug population over the twentieth century, and they have reappeared to colonize the mattresses of the rich and poor alike, infesting five-star hotels and homeless shelters, anywhere people lie down to take their rests. The rise in bedbug numbers is thought to be associated with two factors: more people traveling from one place to another, and increased insecticide resistance.

Bedbugs make roaches look like amiable fellow travelers. While a cockroach is not averse to nibbling human flesh, it does not drink human blood, as does the parasitic bedbug. What's more, the bedbug is much more patient about waiting for its food than a cockroach. A bedbug can hold off feeding for months while it waits for a human being to make his or her warm blood available. But, of course, the terrible itching that bedbugs can cause is nothing compared to the potentially lethal diseases and fevers spread by mosquito bites. Given their threats to our health and tranquility, it is likely that we will continue to wage war with bugs until humans or insects disappear from our planet, and in the long run there's little doubt that we will *not* be the last ones standing.

Despite the fact that we are acculturated to view them as our mortal enemies, cockroaches have a lot to teach us. For one thing, our self-understanding has been greatly enhanced by studying the way roaches are put together. An incalculable number of two-inch long American cockroaches have been dissected in laboratories to elucidate for researchers our own biological functions, and how our nervous systems are wired. The simple and tremendously efficient design of the cockroach has taught scientists a lot. It is hard to imagine a life-form more apparently distinct from our own, but studying cockroaches has revealed many things we can apply to *Homo sapiens*. Berta Scharrer, one of the founders of the science of neuroendocri-

nology, and a Nobel nominee, did her research with roaches. She wrote: "Here is an animal of frugal habits, tenacious of life, eager to live in the laboratory and very modest in its space requirements."

The lessons cockroaches can teach us are not simply neurological and biological, not only those things that we learn when we take them apart in search of clues about the structure of life. They also keep us humble, serving as constant reminders that we are vulnerable to tiny life-forms, that while we may be able to misuse our intelligence to build ever more terrible ways to kill each other, our power is not unlimited. Far from it, because a small roach can repulse us, a wee bedbug can torture us, and something as insubstantial as a mosquito can kill us.

The cockroach lives in our dark spaces, it constantly reminds us that other worlds exist at the margins of all our lives, worlds that obey drastically different orders from the one we know. Roaches construct a whole other reality, which they weave into our own. It is there under the sink, behind the refrigerator, inside the pipes, or just on the other side of the baseboards. A world governed by things like animal instinct, finely tuned reflexes, and close quarters. Cockroaches represent the awful thoughts and feelings lying just under each of our surfaces, lurking just behind the facades we present to the world. We know that repressing these dark desires, rather than acknowledging them, can have disastrous consequences for human beings. Like these pools of darkness in our own selves, cockroaches cannot be eliminated from our lives simply by ignoring them.

Nor should they be. We owe these constant companions a bit of our conscious attention, and close observation rewards us with an understanding of a fascinating reality, so close to, and yet so far from, our own. Hopefully, this edition of the book will continue to function as a field guide to that reality, and fulfill the primary purpose for which I wrote it: to introduce readers to the amazing world of the cockroach.

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Barcelona, 2014