

CHAPTER I

saving all sentient beings

IN THE SUMMER OF 1967, I was twenty-one years old and living in New York City. I had fled from a long childhood and adolescence in Nashville. I slept in the living room of a small, three-room apartment on the second floor of a Christopher Street brick building, half a block west of Sheridan Square. This place had a narrow metal shower built into a corner of the bedroom and the toilet was in a closet off the living room. The woman who paid the rent did so out of a monthly allowance from her family, and she was sleeping with a friend of mine. He moved in and brought a pair of friends with him, one of whom was myself. She was an open and generous soul, so the living arrangements were fine with her.

There was a sofa in the small living room, and the two of us slept out there. I put the cushions on the floor night after night, month after month, and my friend Jeff did his best to make himself comfortable on the sprung springs of the sofa. Every so often, when we ran smack-dab out of cash, we would walk over to the pier on the Hudson River where ships docked with boxes of produce. A large group of men gathered each evening for a shape-up, which meant standing around in a loose cluster inside

a hulking, high-ceilinged wooden warehouse, waiting to see who the foreman would choose to give work to that night. The work entailed loading boxes of fruit and vegetables on to trucks, packing them inside tractor trailers to be hauled across the country. Five dollars an hour, cash at the end of the night.

Work was not a high priority. A half dozen of us spent our time hanging out, drinking cheap wine, smoking good weed, playing music, writing long collective stories, painting together, trying to put rhyme or reason to our lives and the world around us; we were determined to save not only our own asses but those of our friends, neighbors, and every sentient being in that order from the tyranny of history repeating itself, history as dull labor, war, and death. I was usually tired enough and sufficiently substance-saturated by the time everyone else had left or gone to bed, and Jeff and I could dismantle the sofa, that I went right to sleep on the cushions, despite the cracks between them and the narrowness of the platform they provided.

I slept in a T-shirt and underwear, pants and shirt tossed on a chair. There was a particular July morning when I left my dreams behind and woke up, and my first thought, even before opening my eyes was, What a strange feeling: the lightest of ticklings all over my body, as if someone were breathing very gently up and down my stretched-out form. Tiny gusts of air barely ruffling the hairs on my arms and legs. Lazily, I opened my eyes. The evening before, while I had been loading fruit, exterminators had come by and fumigated the building. My supine body was a charnel house, a killing field of dead and dying roaches that had come out from behind the walls, from the dark spaces under the refrigerator and the stove, from all their sanctuaries. They were driven out in confusion as their poisoned bodies broke down, and their nervous systems went haywire. They died slowly, on their backs, legs kicking feebly into the air. The spasmodically jerking legs are what I had felt upon awakening. The roaches covered the floor, thousands of them, and they were dying all over me. I leapt up screaming, my shout open throated

and horrified, as if the cushions had suddenly become a bed of hot coals.

I spent many months of my life sleeping on the floor of that apartment, walking through the neighborhood, east to Greenwich Village, west to the Hudson River. I spent hours and days sitting on the stoop watching the weird world of the West Village go past. I was convinced that this was my life, and a worthy one at that, a conviction I can barely remember now. I can vaguely recall how it felt to feel that way, so certain then that so much idle time would bear fruit further down the road, but now all the days of those years are reduced to nothing but a black hole with shards of recollections scattered here and there, bits of colored cloth caught on the jagged edges of what passes for my memory. But one thing I remember as if it happened yesterday was how those roaches felt dying all over my body.

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In the store the old men gathered, occupying for endless hours the creaking milkcases, speaking slowly and with conviction upon matters of profound inconsequence, eying the dull red bulb of the stove with their watery vision. . . . In the glass cases roaches scuttled, a dry rattling sound as they traversed the candy in broken ranks, scaled the glass with licoriced feet, their segmented bellies yellow and flat.

from *THE ORCHARD KEEPER*
by Cormac McCarthy

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After a while, the shape-up work loading fruit became kind of discouraging. Some nights there wasn't work, and as the fall evenings grew chillier, it was a cold walk over to the pier, so I looked around for something a little steadier. Waiting

on tables seemed like a good idea and I started to walk around the neighborhood, asking. The first waiter's job I landed was at a coffee shop that occupied a corner of Sixth Avenue and West Fourth Street. My debut night on the job, the cook told me to go down in the basement and bring up a sack of potatoes. He was a corpulent black man with strong arms, biceps the size of hams, and a round, bowling-ball head shaved bare. "The light's at the top of the stairs," he said, motioning toward the door to the basement.

I flicked on the switch, and the light illuminated a busy traffic of roaches and rats moving rapidly across the floor at the bottom of the stairs. Lots of animals dine on roaches, including cats, lizards, and monkeys, but they seem to be well out of harm's way in the company of rats, at least where other food is being stored. I was halfway down the stairs before my mind registered what my eyes were seeing and my ears were hearing: the scurrying of a healthy population of both rats and roaches. I turned around and tore back upstairs to bear news of the infestation, shouting, "There's a bunch of roaches and rats downstairs," wondering if the restaurant would have to be closed down while the exterminators were called in to eliminate this obviously state-of-emergency threat to public health.

The cook couldn't stop laughing, even after he'd called in all the rest of the restaurant's staff to tell them how I'd come running back up the stairs yelling that the basement was full of roaches and rats. He laughed until he was wiping away tears with his big white apron, asking, "Where you from anyway, boy? Where you from?" Then he sent me back down for the potatoes.

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Out of the corner of his eye he saw Umbrella Man scoop a roach off the bar in a movement surprisingly swift for one so sluggish—and in the same movement jam it between his teeth.

Frankie's hand stopped on the glass: here came Umbrella Man, the bug's blood streaking down teeth and chin and the bug itself crushed—feelers still waving between the teeth—"Man! Wash! Gimme wash!"—pleading between the clenched teeth and his smeared face right up to Frankie's.

Frankie turned his head away, shoved the beer toward Umbrellas and didn't turn his head back till he heard Umbrellas drain the glass to the last drop.

"He never done anything like that before," Frankie complained to the widow Wieczorek. "What's gettin' into him?"

"He does it all the time now," Widow explained with a certain pride; as if she had taught him such a trick.

from *THE MAN WITH THE GOLDEN ARM*
by Nelson Algren

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Algren was practically impeccable. Not only was he the hardest punching writer in the United States, as his contemporary Ernest Hemingway said after this book was published, but he was a master at combining humor and human horror, the urban novel at its best. A graveyard humor born of tenements, taverns, and neighborhoods, the low-grade, ongoing scuffle to survive, and unlike so many fighters who grow old, his punch never slowed down, his sense of timing never dulled. His penultimate book of fiction, a collection of short stories called *THE LAST CAROUSEL*, published in 1973, is Algren at the top of his form.

He uncharacteristically got a detail wrong in the above passage from his most famous novel, originally published in 1949 and winner of the first National Book Award. Cockroach blood is a pigmentless, clear substance circulating through the

interior of its body, and what usually spurts out of a roach when its hard, outer shell—its exoskeleton—is penetrated or squashed is a cream-colored substance resembling nothing so much as pus or smegma. Not the dark liquid implied in Algren's evocative description of a repulsive way to cadge a beer, a sequence that, unsurprisingly, was entirely left out of Otto Preminger's watered-down film of the novel, which starred a young Frank Sinatra.

The off-white stuff is actually fat, which encases a cockroach's organs, circulatory and nervous systems, a thick layer of goo between the tough cuticle of its shell and its delicate insides. This fat body, as it is called, is where much of the insect's metabolism goes on, and where it stores precious nitrogens and other nutrients to have on hand in case food gets scarce. In fact, if they have access to water, German cockroaches, *Blattella germanica*, the most common domestic roach in the United States and the species we usually see in our kitchens, have been observed to live forty-five days without food, and with neither food nor water they can still survive more than two weeks. Other species, most notably the *Periplaneta americana*, the second most common domestic roach in the U.S., can live much longer. With water, *Periplaneta* has been observed to make it as long as ninety days without food, and has gone some some forty days in the laboratory with neither food nor water. In all species, the females are able to do without for longer than the males.

The cockroach, regardless of species, is built for survival. This is the case for many insects, but cockroaches, as far as we know, are the oldest insect still abroad on the planet, a tremendously successful design in evolutionary terms. Like all insects, they have six legs and a shell made of a hard substance called chitin. Their heads are permanently bent down beneath their carapaces, or shells, with a pair of antennae sticking out in front. Seen in profile, a cockroach's head is always bowed. Its waxy exoskeleton and its shape allow it to squeeze into extremely small spaces, and it can utilize a tremendous range of substances for nourishment. In the wild, different species of cockroaches eat a



Figure 1. Cockroach fossils.

wide variety of things from plant debris to fungus to wood to animal dung, depending on what is available. While numerous animals are classified as omnivores—meaning they will eat anything—few live up to the name so well as roaches. The handful of pest species that hang around people will eat almost everything a human being will, except for cucumbers, which they are reported to dislike avidly, and they will also gladly eat a large number of things we would not willingly consume even if starving, including glue, feces, hair, decayed leaves, paper, leather, banana skins, other cockroaches, dead or live human beings, and warm sour beer, which is one of their favorites.

There are fossils of cockroaches from the Carboniferous period, dating back to around 325 million B.C. They predated dinosaurs by more than 150 million years, and humans by more than 300 million. Whereas every other insect fossil from that epoch shows an animal that is now extinct, the cockroaches found buried deep in the earth of the Lower Illinois coal measure are little changed from those found today in houses on top of

that same ground. They were plentiful during the Carboniferous period, so much so that it is occasionally called the Age of Cockroaches, and they are still plentiful today. More than 5,000 species of cockroach have been discovered and named during the last couple of centuries, and scientists believe that about the same number remain to be found. All cockroaches belong to the order Blattaria, taken from the Greek word *blattae*, which is what the ancient Greeks called the bugs that were their domestic pests.

The closest insect relatives to roaches are termites and the mantids, such as the preying mantis. They, along with crickets and grasshoppers, all share with the roach a mouth that rips, tears, and grinds, but has no teeth, along with broad forewings that are not of much use—often none at all—for flying. All these insects were once grouped under the taxonomic order, Orthoptera, although that has been discarded and the cockroaches given their own. Within Blattaria, there are five families, and of the estimated 10,000 *Blattarian* species in those families, there are only a handful around the world, far less than a hundred, that live near enough to people to ever be seen by them. As might be expected with an animal that loves heat and humidity, tropical jungles are, perhaps, their favorite homes. In 1983, a scientist set six traps out in the jungles of Panama and recovered 164 different species.

However, roaches are not confined to any particular environment and live in a tremendous variety of places, from underneath woodpiles in Alaska to high in the jungle canopy in the tropics of Costa Rica, inside water-filled *Bromeliads* in the rain forests of Trinidad, in underground chambers in Australia, over 7,000 feet up in the mountains of central Asia, in the swamps of Formosa, the caves of Borneo, and under thorn bushes in arid stretches of Kenya. Most of these thousands of different species will never cross paths with a human being. Wherever they live, they are eminently successful at surviving. If there is a God that made all life forms, a particularly rich blessing was

bestowed on the roach, because it got the best design of all. It is, undeniably, one of the pinnacles of evolution on this planet.

As such, we certainly have more to learn from them than they do from us, and, to prove it, humans have spent a tremendous amount of both time and money studying them. There is a surprisingly vast scientific literature about every imaginable aspect of cockroach biology and behavior. Their reproductive biology was being studied and debated throughout the nineteenth century. Despite their obvious differences from us, they are considered to be excellent models for neurobiology. A roach is, so the thinking goes, pure instinct—they are straightforward, sentient machines, eminently knowable at the biological level. The American cockroach, *Periplaneta americana*, has long been a favorite animal for biology students to take apart because of its substantial size and abundance. "It is a reasonable assumption that more cockroaches have been dissected on the laboratory bench than any other insect and more cockroach mouthparts, too, have been examined and drawn under the microscope than those of any other insect," wrote P.B. Cornwell, in his 1968 book, *THE COCKROACH*.

There are, plain and simple, a lot of people with Ph.D.s who make good money working day in and day out with cockroaches. Up until the 1970s, most of the research was in areas related to their biology, how their bodies worked, how they reproduced, and what taxonomic species they belonged to. Since then, there has been a sharp increase in the number of studies related to the social and living habits of the cockroach. A good deal of this has been paid for by chemical companies that manufacture and sell insecticides designed to interrupt those very habits, to control and/or eliminate roaches. Since bedbugs virtually disappeared from the developed world over the past fifty years or so, cockroaches have become the most annoying household pest on many people's lists.

So, in addition to scientists, there is another large class of professionals who make a good living from roaches:

exterminators. Pest control, and more particularly doing battle against cockroaches, generates a lot of money every year. Estimates from the United States Department of Agriculture state that some \$4 billion a year is spent trying to control roaches, ants, rats, and termites; and a recent study put the amount of that spent trying to exterminate cockroaches at \$240 million (Stix, 1994).

The scientific names bestowed on the common pest cockroaches by Swedish naturalist Carolus Linnaeus in the eighteenth century do not accurately reflect their points of origin. For instance, that roach conjured up by Algren on the widow Wiczorek's Chicago bar would have been, most probably, a German cockroach, *Blattella germanica*, now thought to have come with the Phoenicians across the Mediterranean from Africa, and to have spread throughout Russia, Europe, and on to the Americas. This is the one most North American city dwellers see scurrying for cover when they come in at night and turn on the light, and it is the one that provides exterminators with most



Figure 2. German cockroach *Blattella germanica*. Photo © Betty Faber.

of their work. It is the relatively small, brown cockroach that inhabits apartments and houses, usually the kitchens and bathrooms therein.

The German is one of five species of cockroach that are domestic pests in the United States (there are another sixty-four species living far from populated areas, which most people will never see) and it is the most common. It has wings, but they are vestigial, relics from an earlier form. The German cockroach does not fly. Most species of cockroach have wings, but many of them are strictly for show. The second most common cockroach in the U.S., however, still uses its wings for an occasional flight. It is the above-mentioned *Periplaneta americana*, often euphemistically referred to as a *water bug*, but generally known as the American cockroach, although it is not originally from the Americas, but came from Africa on slave ships. American roaches are dark brown and considerably larger than the German. They grow up to nearly two inches and are likely to be found in southern climes and the subtropics, although they are hardy



Figure 3. American cockroach "Waterbug" *Periplaneta Americana*.

© Betty Faber.

enough that patient observation of the area around the boiler in the basement of any New York City apartment building is likely to be rewarded with a sighting of an American cockroach. They prefer life in sewers, basements, and other dark, dank places.

I made their acquaintance a few years back, when I was working a six-month stint as a wage-slave copy editor in Brownsville, Texas, and that is when I learned that these sum-bucks don't scurry when you turn on the light, they fly, although they can't keep it up for long and latch on to the first thing they encounter. Many a night coming back beaten down and worn out after sending the next morning's edition of the *BROWNSVILLE HERALD* to press, brain burned by hours in front of the cold light of the computer screen, I would arrive home wanting nothing so much as a sit-down with a cold beer. I would unlock the front door, flip the light switch, and something that seemed the size of a small bird would whirl past my head. Or a number of some-things, one after the other. As many times as it happened, nearly each of the 180 nights I lived there, I never got accustomed to the sight and sound of those things, wings outstretched as the long brown bodies, startled by the burst of light, launched themselves through the air to land where they would—on a counter, in my hair, clinging vertically to the wall above the sofa, wherever. The best thing about them was that they died easily. The barest tap with a rolled newspaper, even a paper as thin and lightweight as the *HERALD*, was all it took to render one dead.

The third species occasionally encountered by North Americans is the oriental cockroach (*Blatta orientalis*), which generally lives in outdoor garbage and is the most common household species in Europe. The fourth is the brown-banded roach (*Supella longipalpa*), which is not so widespread, but seems to prefer living in libraries or dens. It is also much given to colonizing appliances, which provide it with a much-appreciated warmth. Around a refrigerator motor, or inside television sets, are likely places to have an infestation of them. A fifth species, the smokey-brown (*Periplaneta fuliginosa*), is usually



Figure 4. Brown-banded cockroach *Supella longipalpa*. © Betty Faber.

found south of the Mason-Dixon line, often spends the warm months outside, and when the weather begins to get chilly makes its way indoors.

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Regardless of what the species is, they all have fat bodies. They act as reserves for the roach—in times of plenty, lipids and proteins are stored there, and if food disappears, these can be called on to fuel muscular activity and keep the body nourished. Its function is somewhat analogous to our livers, and the fat body is, in fact, considered to be an organ unto itself. A part of the digestive process—the conversion of food into amino acids—takes place there, as do a number of other metabolic processes, including the breakdown of toxic materials.

Most people who see a cockroach in their home have an almost instinctive urge to step on, squash, swat, or otherwise kill it, but there is no denying that the object of so much revulsion is a marvelously designed envelope for its DNA. The fat body may

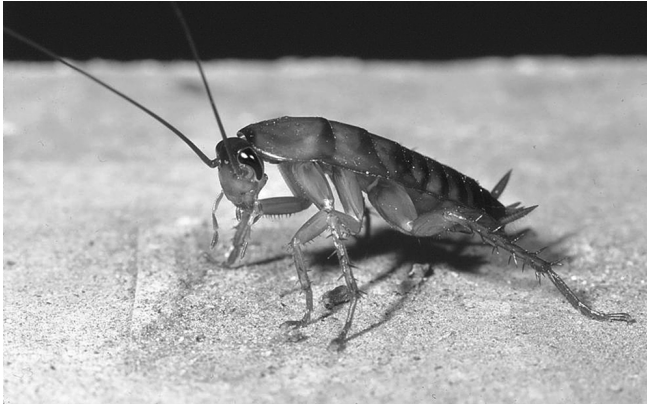


Figure 5. Roach nymph holding an aggressive stance. © Betty Faber.

look like nothing more than creamy, thick jism, but it is a key to the design that has made the cockroach one of the world's most successful life-forms, here long before *Homo sapiens* arrived and with every prospect of still being here when humans are long gone.

Among the nutrients stored in the fat body against a time of scarcity are uric acid salts. Instead of expelling uric acid from the body with its feces, a roach stores a substantial amount of it in the fat body, and these reserves are called urates. There have been a variety of hypotheses as to why a roach does this, the most recent explanation being that prehistoric cockroaches survived on a scavenged, low-nitrogen diet and that when they encountered something to eat with a higher-than-normal nitrogen content, they were able to store it in the form of urates in the fat body to be used later, when nitrogen-rich nutrients were not available. Studies have shown that when a roach is consuming a diet high in nitrogen, urate levels increase, and decrease when the diet is low in nitrogen (Ross and Mullins, 1995).

Another use for the urates appears to be connected to reproduction (Mullins and Keil, 1980). While there are species of cockroaches that give birth to live young, the vast majority reproduce by way of an egg case, called an ootheca, which contains the fertilized eggs and protects them as they develop into embryos. In some species, the female keeps this case in her body until just before the nymphs inside it are ready to come forth into the world, and in other species, the egg case is deposited in what the roach perceives to be a safe and concealed place where it will remain until it hatches. There is substantial evidence that urates are passed to the female by the male during copulation, as part of the sperm packet, or separately depending on the species, and play a role in the formation of the egg case.

Other constituents of the fat body contribute to a roach's metabolic process, such as proteins, lipids, and carbohydrates. These are stored when not needed, and in times of scarcity they are released to provide energy. All of these have been finely measured in the laboratory, by starving roaches for various lengths of time and analyzing their fat bodies at various stages. The numerous metabolic reactions that take place there produce substances that enter the circulatory system.

Nelson Algren did not get it entirely wrong—cockroaches do have blood, or at least a circulatory fluid, which constantly bathes the fat body. This hemolymph, as it is called, is clear in color. What gives our blood its color is the oxygen-carrying hemoglobin in it. Hemolymph does not carry oxygen to the tissues like our own blood does. In fact, oxygen and respiration in the cockroach are wholly different from the system of heart and lungs as we know it.

A cockroach has no lungs and does its breathing through its body. There are ten pairs of openings, called *lateral spiracles*, along the edges of the cockroach's abdomen, each pair more or less opposite another, with two pairs up front at the thorax and the other eight spaced out along, approximately, the back half of the insect. The entrance of air into the spiracles,

which stay closed when not in use to prevent the loss of body moisture, is accomplished in one of two ways: if a roach is at rest with a low oxygen requirement, it can do perfectly well on the amount of air that casually enters the spiracles when they are open. If, however, it is spending a lot of energy, or the temperature is over about 85 degrees Fahrenheit, it will need an additional quantity of oxygen. Contraction and relaxation of abdominal muscles provide the mechanical ventilation needed to draw air into the spiracles. Regardless of how air enters the spiracles, once it is there it passes through the thin walls of the tubes, which branch out like dendrites or coral in a tracheal network through the body, and washes over the surrounding tissues. During this process, carbon dioxide and water are produced. Cockroaches can remain alive "for a number of hours" without any oxygen, according to Cornwell, who notes that if they are kept in an atmosphere of entirely nitrogen, when they are released back into the air they consume an excess of oxygen equal to that of which they have been deprived.

While cockroach blood does not carry oxygen, the hemolymph does serve other familiar sanguinary tasks, such as transporting nutrients and waste products through the roach's body, sealing wounds by coagulating at the point of damage, and carrying hormones from the glands that secrete them to the receptors where they need to go. A cockroach has a tube-shaped heart that pumps the hemolymph toward the head with each of its contractions, forcing a flow throughout the body. Blood enters the twelve-chambered heart through twelve pairs of openings that act as control valves, preventing the hemolymph from flowing back through them and forcing it out of the heart on its one-way circuit of the roach's body.

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Water is a precious thing to a cockroach, so precious, in fact, that if a roach does not have an ample amount of it around, it will not excrete liquids. Rectal pads, located almost at

the end of the animal's excretory system, squeeze water from the mass to be excreted just before elimination. This liquid gets recycled to places like the fat body, and the insect's only excretion will consist of dry solids. Cockroaches do not waste water, and if given a choice they will always make their homes near some: in drains, in a stored sack of slowly softening potatoes, or in a cabinet under a sink where condensation and tiny leaks may create a little moisture.

Cockroaches "smell" water, and food, on certain segments of their antennae, a process that seems to become increasingly acute as the period lengthens in which they have not eaten or drunk. Entomologists have spent months of time and lots of money to show that, under normal conditions, a roach will often not react to nearby food or water. Take a roach that has been deprived of water for a few days, however, and put some water near it. The bug invariably makes a beeline for the water, running, literally a-flutter with excitement. It's really not such an earth-shaking conclusion. Humans behave in much the same way. After a full meal, we can walk by the most alluring odors without noticing them. The smell of garlic frying in olive oil or freshly baked bread stays in the background, claiming no attention, but if we are hungry, we may find that not only does the smell attract our attention, we may actually stop stock-still, turn from our intended route, and go inside to buy whatever it is we are smelling. If a cockroach is not hungry or thirsty, the message from its antenna that says "food" or "water" is just one of many sensory messages being constantly received, and not particularly noteworthy.

Also like humans, most of a cockroach's body water is in its blood, in the hemolymph. An American roach's body water content has been generally said to constitute about 70 percent of its total weight. I read this in a 1965 article from the *JOURNAL OF INSECT PHYSIOLOGY*, called, "Blood, Volume and Water Content of the Male American Cockroach, *Periplaneta americana* L.,—Methods and the Influence of Age and Starvation," in which the authors starved some cockroaches to death while daily measuring

their blood/water volume, and heated others in water (when the water temperature reached 160 degrees Fahrenheit they all died) before determining the water content of their blood (Wharton, 1965). In the authors' discussion of the methods they used, there was no answer to the first question that occurred to me about their methodology: how in the world would someone go about measuring the weight of water contained in a cockroach?

"Simple. You weigh the roach, dry it in the oven, and weigh it again," said Louis Roth, when I went to see him at his Harvard University laboratory. Roth is the dean of cockroach researchers. In 1954, he and a colleague, Edwin R. Willis, wrote a ground-breaking monograph, *THE REPRODUCTION OF COCKROACHES*, published by the Smithsonian Institution, and in 1957 the Smithsonian also published their work, *THE MEDICAL AND VETERINARY IMPORTANCE OF COCKROACHES*, an exhaustive documentation of the diseases carried by roaches and some of the ways in which they might pass them. There were a number of studies in the field, but no one had ever looked at them all together to see if cockroaches really were a threat to human health. Roth's work made it clear they were.

Roth, eighty, spent his professional career as a civilian scientist working for the U.S. Army, which, like many institutions that gather numerous people together to feed and house, is plagued by roaches. He spent thirty years at the Army's Quartermaster Research and Engineering Center in Natick, Massachusetts, just outside of Boston. There is no one else whose work with cockroaches even comes close to the stature of that done by Roth and Willis. Long before the age of computers they combed through the historical record and brought together most of the relevant information about cockroaches from around the world in an exemplary feat of scholarship, and their volumes remain the standard references in the field. After Lou Roth retired from his Army lab in 1977, Harvard gave him a small office above its Museum of Comparative Zoology. When I met him in the summer of 1998, he was coming in to work every morning,

getting up at 5 A.M. and driving to his lab in from his home in nearby Sherborn, Massachusetts.

"For the last few years, my work has been confined to taxonomy," said Roth, a short man with a trimmed beard and a fringe of gray and white hair. "They used to estimate that there were three or four thousand known species of cockroach. Now there are at least five thousand known and at least that many not known. It's easy to pick up new species. Not in the United States, but I get collections from different people all over the world. I can tell right away whether it's new, and there aren't too many people who can do that, so people send me odd species to be identified."

He had a modest grant from Australia that paid for his taxonomic work on samples of roaches found in Australia. His task was to identify the species to which the specimens belong. He was certainly the right person for the job. In his professional lifetime he had identified more than 350 new species of cockroach. The roaches came to him from Australia with a tag describing in detail where they were found. "Twenty miles NW of Queensland Station in leaves by Sand Creek," the handwriting on it might say, the tag tied by a piece of string around the body of a small, dead roach. Roth goes through them, one by one, examining them under his microscope. It is a solid, bulky, hefty microscope, its body made of black cast iron, the same one he has been using since the late 1940s.

"When you get a specimen, let's say a *Blatella*, if it's something found in the woods or a garden somewhere, the only way you can really determine what it is would be to use what we call a key, which is descriptive characters—you have a choice of two characters, you eliminate one, then the remaining one is paired with another and you choose between those two and you keep eliminating characters until you reach a species that has been described and that tells you what it is."

Roth opened his own mail. There was no telling what might be in it. "The roaches I get are from the wild. I'm not really interested in household pests. I've done enough with them," he



Figure 6. Madagascar hissing cockroaches *Gromphadorhina portentosa*. © Betty Faber.

said, an edge of boredom in his voice, which quickly turned to enthusiasm. "Have you ever seen some of the really big roaches?"

"No. I'd like to," I said, in the knee-jerk, bright-eyed reporter's voice that has gotten me into trouble so many times before, and was about to do so again.

"Wow," I continued in the same vein when he showed me a cage full of Madagascar hissing cockroaches (*Gromphadorhina portentosa*), each nearly the length of my middle finger, for God's sake.

"These are the descendants of my original colony. Here, let me give you some to take with you," he said, rooting around in a cabinet and emerging with a small Tupperware container that looked like it might hold three small tomatoes. He took the top off the cage and reached in and began pulling out roaches and dropping them in the Tupperware. As he touched each one, it hissed like an angry cat.

"Are they hissing?" he asked. "I can't hear them anymore."

He wrapped his fingers around them and kept his thumb on top as he transferred seven roaches to that one small container. He lingered over the last one, turning it over in his hand and running his thumb along its underside. "This is a female and she's pregnant. I can tell."

Great. A blessed event in my future. I spluttered my feeble excuses: thanks very much but I really couldn't; I was traveling and wouldn't really be able to care for them; I would eventually be going back to Barcelona, Spain, where I lived, it would be a long trip, and I thought the authorities might be inclined to annul my hard-earned residency papers if customs agents found a plastic container full of live, giant roaches in my luggage; I appreciated the idea of the gift, it's the thought that counts; and please don't think I wasn't grateful, but they were better off staying at Harvard.

He waved away my protests. "No, no. Just leave them in the Tupperware until you get home. They'll be fine. I've got an old banana skin in the garbage around here somewhere that you can put in there. That's all they'll need. Maybe change banana skins after a couple of weeks. They'll be fine."