Chapter 1

NATURE

WHEN I WROTE the following account of my experiences with rats, I lived in an apartment building on a block filled with other apartment buildings, amidst the approximately eight million people in New York City, and I paid rent to a landlord that I never actually met—though I did meet the superintendent, who was a very nice guy. At this moment, I am living out of the city, away from the masses, in a bucolic little village with about the same number of inhabitants as my former city block. I wouldn't normally delve into my own personal matters, except that when I mention my rat experiences to people, they sometimes think I took extraordinary measures to investigate them, and I didn't. All I did was stand in an alley—a filth-slicked little alley that is about as old as the city and secret the way alleys are secret and yet just a block or two from Wall Street, from Broadway, and from what used to be the World Trade Center. All I did was take a spot next to the trash and wait and watch, rain or no rain, night after night, and always at night, the time when, generally speaking, humans go to sleep and rats come alive.

Why rats? Why rats in an alley? Why anything at all in a place that is, let's face it, so disgusting? One answer is proximity. Rats live in the world precisely where man lives, which is, needless to say, where I live. Rats have conquered every continent that humans have conquered, mostly with the humans' aid, and the not-so-epic-seeming story of rats is close to one version of the epic story of man: when they arrive as immigrants to a newfound land, rats push out the creatures that have

preceded them, multiply to such an extent as to stretch resources to the limit, consume their way toward famine—a point at which they decline, until, once again, they are forced to fight, wander, or die. Rats live in man's parallel universe, surviving on the effluvia of human society; they eat our garbage. I think of rats as our mirror species, reversed but similar, thriving or suffering in the very cities where we do the same. If the presence of a grizzly bear is the indicator of the wildness of an area, the range of unsettled habitat, then a rat is an indicator of the presence of man. And yet, despite their situation, rats are ignored or destroyed but rarely studied, disparaged but never described.

I see that I am like one person out alone in the woods when it comes to searching out the sublime as it applies to the rat in the city. Among my guidebooks to nature, there is no mention of the wild rat, and if there is, the humans that write the books call them invaders, despised, abhorred, disgusting—a creature that does not merit its own coffee-table book. Here is the author of a beautiful collection of photographs and prose joyously celebrating the mammals of North America as he writes about rats: "There comes a time when even the most energetic of animal lovers must part ways with the animal kingdom." He goes on: "No matter how much you like animals there is *nothing* good to say about these creatures . . ." It is the very ostracism of the rat, its exclusion from the pantheon of natural wonders, that makes it appealing to me, because it begs the question: who are we to decide what is natural and what is not?

What makes me most interested in rats is what I think of as our common habitat—or the propensity that I share with rats toward areas where no cruise ships go, areas that have been deemed unenjoyable, aesthetically bankrupt, gross or vile. I am speaking of swamps and dumps and dumps that were and still are swamps and dark city basements that are close to the great hidden waters of the earth, waters that often smell or stink. I am speaking, of course, of alleys—or even any place or neighborhood that might have what is commonly referred to as a "rat problem," a problem that often has less to do with the rat and more to do with man. Rats will always be the problem. Rats command a

perverse celebrity status—nature's mobsters, flora and fauna's serial killers—because of their situation, because of their species-destroying habits, and because of their disease-carrying ability—especially their ability to carry the plague, which, during the Black Death of the Middle Ages, killed a third of the human population of Europe, something people remember, even though at the time people didn't know that rats had anything to do with all the panic, fear, and death.

In fact, in New York City, the bulk of rats live in quiet desperation, hiding beneath the table of man, under stress, skittering in fear, under siege by larger rats. Which brings me to my experiment: I went to the rat-filled alley to see the life of a rat in the city, to describe its habits and its habitat, to know a little about the place where it makes its home and its relationship to the very nearby people. To know the rat is to know its habitat, and to know the habitat of the rat is to know the city. I passed four seasons in the alley, though it was not a typical year by any definition. As it happened, shortly after I went downtown, the World Trade Center was destroyed. That fall, New York itself became an organism, an entity attacked and off-balance, a system of millions of people, many of whom were scared and panicked—a city that itself was trying to adapt, to stay alive. Eventually, New York regained its balance, and I went about my attempt to see the city from the point of view of its least revered inhabitants. And in the end—after seeing the refuse streams, the rat-infested dwellings, after learning about the old rat fights and learning all that I could learn from rat exterminators and after briefly traveling off from my alley to hear about rats all over America—I believe this is what I saw.

FOR MOST OF MY LIFE, however, my interest in rats had remained relatively idle, until the day I stumbled on a painting of rats by one of the patron saints of American naturalists, John James Audubon. Audubon famously documented the birds of North America in their natural habitat—*drawn from nature* was his trademark—and he next did the same for mammals, even the rat, or in this case several rats in a barn, stealing a chicken's egg. As I investigated the painting, I learned that Audubon had

researched rats for months, and that in 1839 in New York City, where he lived during the last years of his life, he hunted rats along the waterfront. (He wrote the mayor and received permission "to shoot Rats at the Battery early in the morning, so as not to expose the inhabitants in the vicinity to danger . . .") In other words, Audubon was not just a Representative Man out of the American past whose legacy inspired American conservationists and environmentalists, not just some Emersonian model, but also a guy who spent time in New York City walking around downtown looking for rats.

I read more about Audubon. I read that he was born in what is now the Dominican Republic. I read that he turned to painting late in life after failing as a businessman, and that after traveling all over the continent to finish *The Birds of North America* he moved to New York, living first downtown, then up on what is today 157th Street, in a neighborhood that is coincidentally now settled by people from the Dominican Republic—coincidence is the stuff of ratting! I read that he fished in the Hudson River. I read that his eyesight eventually went, that shortly thereafter he began singing a French children's song over and over and eventually died. His home was left to rot away and was finally paved over. The more I read of Audubon, the more I felt a desire to study the rat in its urban habitat, to *draw the rat in nature*.

One day, I got on the subway and took a trip uptown. I went to Trinity Cemetery on 155th Street and saw the tall, animal-covered Celtic cross on Audubon's grave, and then, with old maps, I tried to figure out where his house would have been. Finally, I found the lot, unmarked; it had apparently once been on a gentle hill sloping toward the river, but now it was a hole, a three-story-deep pit, surrounded by two tall apartment buildings, and an elevated highway. When I looked away from the hole, the view was breathtakingly panoramic and Hudson River-filled. And when I got my binoculars out and looked down into the site, I could see the dozens of tennis-ball-size burrows that are more commonly referred to as rat holes.

Chapter 2

THE CITY RAT

BUT ENOUGH ABOUT *you,* I think I hear the reader protesting. What about rats? And so, as I arise from my selfishness to describe the wild rat of New York City, the object of this nature experiment, I begin by noting that when it comes to rats, men and women labor under a lot of misinformation—errors inspired, it seems to me, by their own fears, by their own mental rat profiles rather than any earth-based facts. So, with this in mind, I offer a brief introductory sketch of the particular species of rat that runs wild in New York—*Rattus norvegicus,* aka the Norway or brown rat. I offer a portrait that is hysteria-free, that merely describes the rat as a rat.

A rat is a rodent, the most common mammal in the world. *Rattus norvegicus* is one of the approximately four hundred different kinds of rodents, and it is known by many names, each of which describes a trait or a perceived trait or sometimes a habitat: the earth rat, the roving rat, the barn rat, the field rat, the migratory rat, the house rat, the sewer rat, the water rat, the wharf rat, the alley rat, the gray rat, the brown rat, and the common rat. The average brown rat is large and stocky; it grows to be approximately sixteen inches long from its nose to its tail—the size of a large adult human male's foot—and weighs about a pound, though brown rats have been measured by scientists and exterminators at twenty inches and up to two pounds. The brown rat is sometimes confused with the black rat, or *Rattus rattus,* which is smaller and once inhabited New York City and all of the cities of America but, since *Rattus norvegicus* pushed it out, is now relegated to a

minor role. (The two species still survive alongside each other in some Southern coastal cities and on the West Coast, in places like Los Angeles, for example, where the black rat lives in attics and palm trees.) The black rat is always a very dark gray, almost black, and the brown rat is gray or brown, with a belly that can be light gray, yellow, or even a pure-seeming white. One spring, beneath the Brooklyn Bridge, I saw a red-haired brown rat that had been run over by a car. Both pet rats and laboratory rats are *Rattus norvegicus,* but they are not wild and therefore, I would emphasize, not the subject of this book. Sometimes pet rats are called fancy rats. But if anyone has picked up this book to learn about fancy rats, then they should put this book down right away; none of the rats mentioned herein are at all fancy.*

Rats are nocturnal, and out in the night the brown rat's eyes are small and black and shiny; when a flashlight shines into them in the dark, the eyes of a rat light up like the eyes of a deer. Though it forages in darkness, the brown rat has poor eyesight. It makes up for this with, first of all, an excellent sense of smell. Rats often bite young children and infants on the face because of the smell of food residues on the children. (Many of the approximately 50,000 people bitten by rats every year are children.) They have an excellent sense of taste, detecting the most minute amounts of poison, down to one part per million. A brown rat has strong feet, the two front paws each equipped with four clawlike nails, the rear paws even longer and stronger. It can run and climb with

* Fancy rats are related to the wild *Rattus norvegicus* very possibly because of Jack Black, the rat catcher to Queen Victoria. Jack Black caught rats for the queen, but he also kept rats that interested him for himself. He sold some of these rats to women; in the Victorian era, keeping rats as pets was a fad—Beatrix Potter is thought to have bought her pet rat from Jack Black himself. Jack Black also bred a strain of albino *Rattus norvegicus* that he subsequently sold to Victorian-era scientists in France. Laboratory rats are today available for purchase on-line; a scientist can order the rat as per his or her experimental rat-genetics needs. The progenitor of the modern laboratory rat is the Wistar rat, a rat bred in the Wistar laboratories in Philadelphia. I have read that the Wistar rat was begun with an albino rat that the Wistar Institute originally got from France. I like to think that all the great scientific achievements that have been made in the modern scientific era as a result of work with laboratory rats are ultimately the result of the work of Jack Black, rat catcher.

squirrel-like agility. It is an excellent swimmer, surviving in rivers and bays, in sewer streams and toilet bowls.

The brown rat's teeth are yellow, the front two incisors being especially long and sharp, like buckteeth. When the brown rat bites, its front two teeth spread apart. When it gnaws, a flap of skin plugs the space behind its incisors. Hence, when the rat gnaws on indigestible materials—concrete or steel, for example—the shavings don't go down the rat's throat and kill it. Its incisors grow at a rate of five inches per year. Rats always gnaw, and no one is certain why—there are few modern rat studies. It is sometimes erroneously stated that the rat gnaws solely to limit the length of its incisors, which would otherwise grow out of its head, but this is not the case: the incisors wear down naturally. In terms of hardness, the brown rat's teeth are stronger than aluminum, copper, lead, and iron. They are comparable to steel. With the alligator-like structure of their jaws, rats can exert a biting pressure of up to seven thousand pounds per square inch. Rats, like mice, seem to be attracted to wires—to utility wires, computer wires, wires in vehicles, in addition to gas and water pipes. One rat expert theorizes that wires may be attractive to rats because of their resemblance to vines and the stalks of plants; cables are the vines of the city. By one estimate, 26 percent of all electric-cable breaks and 18 percent of all phone-cable disruptions are caused by rats. According to one study, as many as 25 percent of all fires of unknown origin are rat-caused. Rats chew electrical cables. Sitting in a nest of tattered rags and newspapers, in the floorboards of an old tenement, a rat gnaws the head of a match—the lightning in the city forest.

When it is not gnawing or feeding on trash, the brown rat digs. Anywhere there is dirt in a city, brown rats are likely to be digging—in parks, in flowerbeds, in little dirt-poor backyards. They dig holes to enter buildings and to make nests. Rat nests can be in the floorboards of apartments, in the waste-stuffed corners of subway stations, in sewers, or beneath old furniture in basements. "Cluttered and unkempt alleyways in cities provide ideal rat habitat, especially those alleyways associated with food-serving establishments," writes Robert Corrigan in *Rodent Control*, a pest control manual. "Alley rats can forage safely within the

shadows created by the alleyway, as well as quickly retreat to the safety of cover in these narrow channels.'' Often, rats burrow under concrete sidewalk slabs. Entrance to a typical under-the-sidewalk rat's nest is gained through a two-inch-wide hole—their skeletons collapse and they can squeeze into a hole as small as three quarters of an inch wide, the average width of their skull. This tunnel then travels about a foot down to where it widens into a nest or den. The den is lined with soft debris, often shredded plastic garbage or shopping bags, but sometimes even grasses or plants; some rat nests have been found stuffed with the gnawed shavings of the wood-based, spring-loaded snap traps that are used in attempts to kill them. The back of the den then narrows into a long tunnel that opens up on another hole back on the street. This second hole is called a bolt hole; it is an emergency exit. A bolt hole is typically covered lightly with dirt or trash—camouflage. Sometimes there are networks of burrows, which can stretch beneath a few concrete squares on a sidewalk, or a number of backyards, or even an entire city block—when *Rattus norvegicus* first came to Selkirk, England, in 1776, there were so many burrows that people feared the town might sink. Rats can also nest in basements, sewers, manholes, abandoned pipes of any kind, floorboards, or any hole or depression. ''Often,'' Robert Corrigan writes, '' 'city rats' will live unbeknownst to people right beneath their feet.''

Rats also inhabit subways, as most people in New York City and any city with a subway system are well aware. Every once in a while, there are reports of rats boarding trains, but for the most part rats stay on the tracks—subway workers I have talked to refer to rats as ''track rabbits.'' People tend to think that the subways are filled with rats, but in fact rats are not everywhere in the system; they live in the subways according to the supply of discarded human food and sewer leaks. Sometimes, rats use the subway purely for nesting purposes; they find ways through the walls of the subway stations leading from the tracks to the restaurants and stores on the street—the vibrations of subway trains tend to create rat-size cracks and holes. Many subway rats tend to live near stations that are themselves near fast-food restaurants. At the various subway stations near Herald Square, for example, people come down from the streets and

throw the food that they have not eaten onto the tracks, along with newspapers and soda bottles and, I have noticed, thousands of no-longer-charged AA batteries, waiting to leak acid. The rats eat freely from the waste and sit at the side of the little streams of creamy brown sewery water that flows between the rails. They sip the water the way rats do, either with their front paws or by scooping it up with their incisors.

DEATH COMES IN MANY FORMS for a brown rat living in the wilds of the city. A rat can be run over by a car or a bus or a cab. It can be beaten with a plunger as it climbs up through a sewer pipe and surfaces into an apartment's toilet bowl. Cats, while mice eaters, are not likely to attack adult rats; a rat will easily repeal an attack by a cat, though cats will kill young rats. In the city's less populated areas, or in the little patches of parkland and green, rats sometimes die quasi-wilderness deaths. In Brooklyn's Prospect Park, I once watched a large red-tailed hawk swoop down on a brown rat, an adult male that had been living in a burrow in a wooded area adjacent to an overstuffed garbage can. The hawk then flew into the upper branches of a maple tree, dangling the large, still-wriggling rat from its talons. People have confided rat shootings to me on numerous occasions; in fact, more people than I had ever imagined shoot rats in the city—using pellet guns or air rifles or even more potent rifles in alleys and in infested basements. And of course, rats also die when they are caught in snap traps, which is the trap sometimes referred to as a break-back trap, a rat-size version of the classic mousetrap. It is especially difficult to trap a rat with a snap trap. Generally speaking, rodents are wary of new things in their habitat, preferring routine to change; biologists refer to this trait as neophobia. Rats can be even more neophobic than mice. Thus, exterminators are likely to leave unset snap traps out for a few days before setting them, often baited, allowing the rats to become comfortable with traps. Some exterminators regularly treat snap traps with bacon grease.

Most frequently rats die from ingesting poison. I don't know of a precise statistic, but I know that at any given moment there is poison all over the streets and homes of New York, not to mention the rest of

America. Sometimes, poison is injected directly into the rat burrow; the rat dies of heart failure or, with the most severe poisons, of damage to its central nervous system—they are found dead on their bellies, arms and legs extended. More often, poison is added to grains and the grain is put into shoe-box-size containers called bait stations. Bait stations are the things that people in cities see constantly in back alleys and in parks and do not recognize or, chances are, even think about. Bait stations are designed to keep bait away from pets and children, but they are also designed as little rat-friendly zones. With their small holes and zigzaggy interiors, bait stations are to a rat what a smoothly run fast-food restaurant is to a human. When rats eat the poisoned grain in the bait station, they return to their nests to die—in walls, in floors, underneath streets and restaurant stoves, in sewers. The most widely used poisons are anticoagulants, which cause the rat to bleed to death internally. It takes several meals for the rat to die. As it returns, it sometimes seems more and more woozy. Exterminators refer to this phenomenon as "dead rodent walking."

Ingesting poison, fighting for food, being attacked by a larger rat or beaten with a toilet plunger: these are everyday rat dangers that make the life expectancy of the rat in the city approximately one year. And yet rats persist; they thrive in New York City and in cities throughout the world. Rats do not inhabit cities exclusively, of course; like man, rats can live anywhere. Brown rats in wilderness areas are sometimes called feral rats; they survive on plants and insects and even swim to catch fish.* However, brown rats are generally larger and more

* One of the most impressive examples of a rat incursion in a noncity area was the invasion of brown rats on Campbell Island, a remote patch of land south of New Zealand near Antarctica. They were thought to have been imported to the island by whaling ships in the nineteenth century. The rats destroyed the local population of birds, including a rare flightless teal and a wading duck. In 2002, the New Zealand government destroyed all of the rats by bringing 120 tons of rat poison to the island in boats and helicopters. Approximately 200,000 rats are thought to have died. The rat eradication, frequently referred to as the largest-ever rat hunt, encountered some problems, however. A tanker carrying 18 tons of rat poison to the island sank in a whale breeding ground. The rat poison has subsequently showed up in the local mussel population. Reports suggested that all of the rats were killed. The government hopes to reintroduce the teal and the duck.

numerous in cities. As a result, it is in cities that they are especially successful at spreading the diseases that are like poisons to humans. They carry diseases that we know of and they may carry diseases that that we do not know of—in just the past century, rats have been responsible for the death of more than ten million people. Rats carry bacteria, viruses, protozoa, and fungi; they carry mites, fleas, lice, and ticks; rats spread trichinosis, tularemia, leptospirosis. They carry microbes up from the underground streams of sewage; public health specialists sometimes refer to rats as "germ elevators." Though targeted over and over by man, rats generally wreak havoc on food supplies, destroying or contaminating crops and stored foods everywhere. Some estimates suggest that as much as one third of the world's food supply is destroyed by rats.

Rats succeed while under constant siege because they have an astounding rate of reproduction. If they are not eating, then rats are usually having sex. Most likely, if you are in New York while you are reading this sentence or even in any other major city in America, then you are in proximity to two or more rats having sex. Male and female rats may have sex twenty times a day, and a male rat will have sex with as many female rats as possible—according to one report, a dominant male rat may mate with up to twenty female rats in just six hours. (Male rats exiled from their nest by more aggressive male rats will also live in all-male rat colonies and have sex with the other male rats.) The gestation period for a pregnant female rat is twenty-one days, the average litter between eight to ten pups. And a female rat can become pregnant immediately after giving birth. If there is a healthy amount of garbage for the rats to eat, then a female rat will produce up to twelve litters of twenty rats each a year. One rat's nest can turn into a rat colony of fifty rats in six months. One pair of rats has the potential of 15,000 descendants in a year. This is a lot of rats, and while the regenerative capabilities of the rat might seem incomparable to those of any other species, in *Rats, Lice, and History*, the classic work on the effect of disease on human history, Hans Zinsser suggests that the fertility rate of the human can rival the fertility rate of the rat.

★ ★ ★

ONE OF THE THINGS I find most fascinating about rats is that they have a sense of where they are and of where they have been. This is explained by the fact that rats love to be touching things. Biologists refer to rats as thigmophilic, which means *touch loving*. Consequently, rats prefer to touch things as they travel. Their runways are often parallel to walls, tracks, and curbs; in infested basements, grease slicks parallel ceiling beams and the run of sewer pipes. Rats are thought to feel especially safe at corners, when they are simultaneously touching a wall and free to escape. As they travel again and again for food, as they escape oncoming trucks or, upon the return home of a drunk human apartment dweller, flee into the relative safety of garbage cans, rats develop a muscle memory, a kinesthetic sense that allows them to remember the turns, the route, the course of movement. As young rats follow older rats, the trails are repeated, passed on. Exterminators like to say that if the walls of an alley or a rat-infested block were somehow taken down without disturbing the rats, the rats would awaken the next evening, venture forth, and travel precisely the same routes as the night before, as if the walls were still there. They would remember the walls. Deep in their rat tendons, rats know history.

A rat phenomenon that is based only partly on fact is the Rat King, a kind of rat often mentioned in stories about rats. The Rat King is usually described as the rat that leads other rats when rats amass and herd. Policemen on late night patrols sometimes report seeing a Rat King lead a group of rats across a street. Drunks frequently report Rat King sightings. It *is* true that from time to time rats run in huge packs. I have seen them do so. Likewise, it is true that within a rat colony a dominant male rat emerges. However, it is not the case that one rat leads the others. Something that has inspired the notion of a mythical Rat King is the actual phenomenon of rats whose tails have become knotted together with other rats' tails in their nest. The resulting entanglement is called a Rat King. There have been Rat Kings ranging in size from three rats to thirty-two rats. Sometimes the rats die, sometimes they are fed by the other rats and stay alive for a time in the nest. In myths and stories about marauding rats and secret rat

leagues, the Rat King sometimes sits in the center of tied-up rats' tails, the lesser rats his throne. But again, these are rat stories. An actual Rat King is really nothing more than a rat that takes advantage of his natural strengths and of other rats' natural weaknesses. A Rat King is just a big rat.

THE RAT IS A NEWCOMER to America, an immigrant, a settler, its ancient roots reaching to Southeast Asia. The black rat migrated south, while the brown rat migrated north, to China, along the Yangtze River, and then into Siberia near the present-day Lake Baikal. The black rat came to Europe ahead of the brown rat, with the Crusades. The brown rat did not appear in Europe until the beginning of the eighteenth century. There are accounts of brown rats crossing the Volga River in hordes in 1727, and more reports of brown rats proceeding across Russia to the Baltic Sea. Brown rats were reported in east Prussia, France, and Italy in 1750; they were reported in Norway in 1768 and in Sweden in 1790. Brown rats are thought to have been brought by ship from Russia to Copenhagen in 1716 and to Norway from Russia in 1768. Spain did not have brown rats until 1800. They arrived in England in 1728, and in 1769, in *Outlines of the Natural History of Great Britain*, John Berkenhout named the brown rat *Rattus norvegicus*. He most likely misnamed the rat. He believed that the rats had come to England via Norwegian lumber ships, when in fact they had probably come from Denmark, since at the time Norway rats had not yet settled in Norway.

By 1926, *Rattus norvegicus* was in every state in America. It pushed out black rats everywhere, though a small colony of black rats held on in New England for many years. The last state to be settled by *Rattus norvegicus* was Montana. Several early rat settlements in Montana failed or were wiped out with poisons and traps, but the brown rat finally colonized Lewistown in 1920, and in 1938, the dump in Missoula was the site of an escaped colony of laboratory rats, domesticated *Rattus norvegicus*. It was not easy for the brown rat to settle Montana. "In general it appears that rats find extension in their range difficult in

Montana and that in all likelihood this difficulty is due to the sparseness of the population," a biologist in Bozeman wrote. Brown rats also eventually spread to all the provinces of Canada, with the exception of Alberta, where in 1950 they were reported on the southeast border but were then repelled by an intensive government rat control program, one of the most impressive rat-control programs in the world. Alberta still considers itself, in the words of the province's agricultural department, "an essentially rat-free province."

Little is written about the early settlement of *Rattus norvegicus* in America. Most reports state that the very first *Rattus norvegicus* arrived in America in the first year of the Revolution, then moved out into the country, a manifest infestation. One of their first landings was most likely New York City.