TABLE OF CONTENTS

Introduction

MICROORGANISMS AND MACROHISTORY

ONE OF THE CHIEF BLESSINGS of living in the modern world is supposed to be that the risk of dying from an infectious disease has become vanishingly small. The nuisances of modern civilization are a small price to pay for the good fortune of being alive at a time when our germs have been brought to heel. We can grudgingly resign ourselves to the inevitability that cancers, chronic diseases, or degenerative disorders will catch up to us someday. We moderns die of old age, of overabundance, of cellular malfunction . . . but not plagues and poxes. Until, that is, a new pestilence has the temerity to disrupt our daily lives, here and now.

More than we are apt to remember, even in the shadow of a pandemic, the world we inhabit thoroughly presupposes the subjugation of infectious disease. Consider, if you are privileged enough to live in a developed society, a routine morning. It starts with a walk across a cold (but easily disinfected) tile floor to deposit roughly one hundred grams of stool in a gravity-powered flushing device. A few liters of water, carrying nine trillion or so bacteria, are whisked away for treatment. A thin, two-ply tree product minimized contact between your waste and your hands, but for good measure you wash them anyway, using soap containing mild antibiotic compounds. In the shower you douse your whole body with gentle disinfectants, and then apply a jelly loaded with an aluminum compound to waylay the malodorous bacteria in your underarms.[1]

When you walk into the kitchen, you open a refrigerated box and feel the 40°F air rush out—just cool enough to slow the decay of the dead fruits, vegetables, and animals inside. You grab (on a weekend morning, perhaps) some slices of slaughtered pig, tightly wrapped in an impermeable sheet of cellulose that keeps bacteria and oxygen out. Using one of the very oldest technologies, you light a fire—or at least twist a knob that does it for you—and heat your meat until it is around 150°F, and the microbes hanging all over it are good and dead. When you drink a glass of water, the fact that it has been mildly chlorinated upstream of your faucet relieves you of any need to worry that you will contract a ghastly intestinal disease. And should you pour yourself a glass of cow's milk, you can be assured that any microbial stowaways were exterminated in a process developed by the father of germ theory himself, Louis Pasteur.

Belly appeased, you leave the house owned by the bank that made you a thirty-year loan on the safe bet that you will be alive long enough to pay the money back. You depart through a door that is sealed to keep out rodents, mosquitos, and other carriers of pathogens. Perhaps you load your kids (on average, just over two of them) into the van, taking them to a school where they spend more than a decade sponging up knowledge for a future they fully expect to see. Thankfully, it is safe to put your darlings in a building with hundreds of other humans because they have immune systems artificially primed by vaccines to withstand a whole array of half-forgotten diseases. You accept, and bear gracefully, the seasonal colds and sore throats that are the price of existence on a crowded planet.

Our whole way of life depends on the control of infectious disease. But the dominance of *Homo sapiens* over its microbial enemies is astonishingly recent. Throughout most of human history, pathogens and parasites held the upper hand. Infectious diseases were the leading cause of death into the twentieth century. There have been about ten thousand generations of humans so far. For all but the last three or four generations, life was short, lasting on average around thirty years. Yet this average is deceptive, because life in a world ruled by infectious disease was both short *and* uncertain. Infectious diseases came in steady drips and in massive unforeseen waves. The control of infectious disease thus did more than double the average human lifespan. It changed our most basic expectations about suffering and predictability.[2]

Humanity's control is not only recent. It is also incomplete, in at least two senses. First, it is geographically uneven. In large parts of the world, infectious diseases remain an everyday threat. The freedom from fear of pestilence is a privilege not uniformly shared around the planet—an insidious fact whose history this book seeks to retrace. Second, our control of infectious disease is fragile. The tools we possess to mitigate the risks of infectious disease are many and clever, but they are also imperfect. Meanwhile, the evolution of new threats not only continues but accelerates, as human numbers rise and as we put pressure on natural ecosystems. For a parasite, there is now more incentive to exploit humans than ever. We do not, and cannot, live in a state of permanent victory over our germs. Eternal vigilance is the price of liberation from infectious disease, but interruptions are inevitable, not anomalous.

The COVID-19 pandemic has been a painful reminder of this vulnerability. A history of infectious disease can help us understand why such an outbreak was bound to happen—and why there will be another pandemic after this one, and then another. It can also prepare us to see that infectious diseases continue to affect our lives profoundly, in ways that are both visible and invisible. The danger of disease shapes our personal routines, everyday environments, and unspoken assumptions about life and death. It also permeates our relationship to the planet and to each other. The history of disease is the history of migration and power, of poverty and prosperity, of progress and its unintended consequences. In short, our history as a species is inseparable from our strange and intimate connection with the parasites that have stalked our journey every step of the way.

The Contours of History

This book is a study of infectious disease in human history. Infectious disease is a state of impaired health caused by an invader—a pathogen, a parasite, or, more colloquially, a germ (chapter 1 explores these terms in more rigorous detail). The severity of infectious disease runs the spectrum from mere annoyance to existential threat. Our pathogens fall into five big biological groups (or taxa): fungi, helminths, protozoa, bacteria, and viruses. Fungi are all around us but usually only pose a severe threat to the health of the immunocompromised. Helminths are worms, some of our oldest parasites. Protozoa are single-celled microorganisms that cause sinister diseases like malaria. Bacteria are also single-celled organisms, but, unlike protozoa, they lack an organized nucleus. They are responsible for many of our worst afflictions, including plague, tuberculosis, cholera, typhus, and typhoid fever. Viruses are infectious agents stripped down to the essentials; they replicate themselves by inserting their genetic code into the machinery of the host's cell. Viruses cause smallpox, measles, yellow fever, influenza, polio, AIDS, the common cold, and COVID-19.[3]

Every organism on earth, from the simplest bacterium to the blue whale, is exploited by parasites. In nature, the rules of parasitism—what determines the parasites that any organism will suffer—are governed by ecology and evolution. Consider our closest surviving relative, the chimpanzee. Chimps have the parasites they have because they live in equatorial forests, eat a range of plants, insects, and small monkeys, and exhibit certain social habits and behavioral traits. Their parasites will change over time, in response to the natural ups and downs of chimpanzee populations, and the continuous cycle of emergence and extinction among microbes. Chimpanzees have a natural history, insofar as they have evolved as a species and have existed for a few million years. But they do not have a history in the way we usually mean "history." Their societies do not have cumulative culture-driven change over time. Chimps one hundred thousand years ago lived essentially the same way that chimpanzees live today. They used the same simple tools and ate the same menu of forest foods. Chimps one hundred thousand years ago would have suffered from a set of diseases not so different from what their successors face today.[4]

By contrast, humanity's diseases result from the interplay of ecology, evolution, and a third term: history. Our dispersal across the globe, the transition to sedentary lifestyles and agriculture, the rise of cities, the growth of overland and overseas networks, the takeoff to modern economic and population growth, and so on, have reshaped the ecology and evolution of our germs. Humans today practice lifestyles that would have been unrecognizable a century ago, much less one hundred thousand years ago. Because of this history, we also have a disease pool our ancestors would not recognize. When *Homo sapiens* evolved, some two hundred to three hundred thousand years ago in Africa, the vast majority of the pathogens we suffer today did not yet exist. Even ten thousand years ago most of our pathogens had not yet emerged. There was no tuberculosis, no measles, no smallpox, no plague, no cholera, no AIDS, and so on. In that sense, our deadly disease pool is an artefact of our history. We are apes who learned to master fire, domesticate plants and animals, conquer distance, build machines, and tap fossil energy. We live like no other ape, and in consequence we have a brood of parasites unlike any of our relatives in the animal kingdom.

The goal of this book is to tell the story of how we have acquired our distinct disease pool and what it has meant for us as a species. It is a history in which we are part of nature, rather than apart from it. The rules of ecology and evolution still apply to us, but our history influences ecology and evolution in uniquely powerful ways. On this reckoning, disease-causing microbes, in all their glorious particularity, are historical actors, and it is worth the effort to get acquainted with the most influential among them. Yet the emergence, incidence, and consequences of disease, in individuals and populations alike, are always inseparable from a wider array of social and environmental factors. The central theme of the book is thus simple. Human history shapes disease ecology and pathogen evolution; disease ecology and pathogen evolution in turn shape the course of human history. Our germs are a product of our history, and our history has been decisively patterned by the battle with infectious disease.

To understand how our progress as a species has created the distinctive human disease pool, we must commit ourselves to seeing the world through the "eyes" of our germs. From a parasite's perspective, a human is simply a host. Our parasites' goals are not to harm us per se, but to pass on their genes to future generations. In a basic sense, it is obvious why humans are such irresistible hosts. Thanks to technological innovation, we are very good at extracting energy from the environment and turning it into human cells. Consider just our sheer numbers. Other great apes have global populations up to a few hundred thousand. There are now nearly eight billion of us. Just as robbers steal from banks because that is where the money is, parasites exploit human bodies because there are high rewards for being able to do so.[5]

Of course, it is not only our immoderate numbers but almost everything about the way we live—how we use nature, how we congregate and connect—that shapes our disease ecology. The book is organized around four transformative energy revolutions. The first such revolution—the mastery of fire—long precedes the emergence of *Homo sapiens*, although human evolution is entirely dependent on this primordial technology. Fire allowed our ancestors to disperse out of Africa and settle from the equator to the arctic. Humans have the extraordinary capacity to occupy virtually every niche on Earth. This versatility exposed our ancestors to an unusual variety of potential pathogens and also created important differences in the disease burden faced by different human societies. Physical geography plays an important role in infectious disease. For instance, tropical regions have borne—and continue to bear—the heaviest burden of disease. This inequity in the disease burden between human populations is one of the really distinctive features of our species, and it is shaped by geography. But the extent, nature, and consequences of the uneven disease burden have changed over time, as the entanglements of ecology, power, and disease have been continuously reshaped throughout our history.[6]

The second energy revolution was the invention of farming. Starting around ten thousand years ago, in different foyers across the globe, human societies learned to control the reproduction of preferred species of plants and animals. As farming spread, human numbers soared, and the result has been a virtually unceasing acceleration of parasite evolution. Farming also created a novel and intimate ecological relationship between humans and other animals. One of the goals of this book is to revise the familiar story in which our farm animals were the definitive source of new diseases. That story is not so much wrong as incomplete. Cross-species transmission of microparasites is pervasive in nature. We now understand that most human diseases originate from wild animals—for instance, from bats and rodents. Our domesticates—cows, pigs, sheep, horses, camels, and so on—have more often been an evolutionary bridge than an ultimate reservoir of human pathogens. What permanently changed with farming, then, was humanity's place in the broader web of animal life—and animal disease (see figure 0.1).

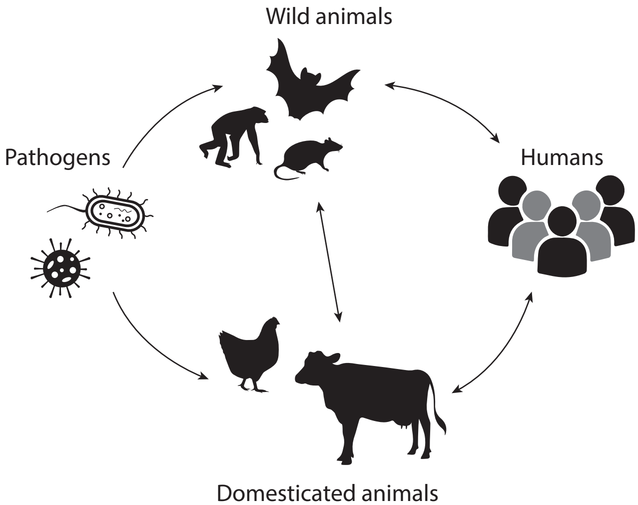

FIGURE 0.1. Disease webs: pathogens transmit between different species. Pathogens have varying degrees of host specificity, and they can adapt to new hosts.

Agriculture also required ancestral hunter-gatherers to trade their mobile ways for a permanent address. In turn, the sedentary lifestyle created ecological niches for germs that flourished in the unique waste environments surrounding human settlements. Diarrhea and dysentery became more formidable problems for human health in the first millennia of farming. Yet, agriculture did not immediately spawn most of the so-called crowd diseases, caused by respiratory pathogens that require large, dense populations to sustain permanent transmission. Only later, with bronze and iron metallurgy, the domestication of donkeys and horses, and the rise of true cities and large empires, did more and more respiratory pathogens (like the agents of measles and smallpox) enter the permanent human disease pool. Civilizations in the Bronze and Iron Ages also became more interconnected, and long-distance networks allowed diseases to circulate across Europe, Asia, and Africa during this period. Great killers like tuberculosis and malaria diffused across the Old World, while the most peculiar and most explosive of the ancient diseases—bubonic plague—took advantage of the worldwide network of rats that human progress had unintentionally constructed.

A third energy revolution, of sorts, was brought about by the regular crossing of the Atlantic Ocean. The voyages of Christopher Columbus reconnected the hemispheres after millennia of near total separation. The diverse peoples of the Americas were devastated by the introduction of European germs and the imposition of European colonization. Equally deserving of attention is the gradual reunification of the tropics, as equatorial germs migrated westward over the ocean. The result was a new geography of disease in the Americas, mirroring the gradients of health in the Old World. Contact with the New World was also transformative for Europe, Africa, and Asia. Atlantic-facing European societies, which were gifted with some of the naturally healthiest environments on the planet, were now at the center rather than the periphery of the world's most important economic networks. At a decisive moment of global history, these societies weathered the "general crisis" of the seventeenth century, whose biological dimensions are sketched in chapter 9. The breakthrough to modern growth and good health was achieved not because the old diseases whimpered out, but because human societies (and stronger states) adapted, even in the face of more daunting, and increasingly globalized, biological challenges.

The fourth energy revolution was the harnessing of fossil fuels. Eons of congealed sunlight stored underground as coal (and later oil and gas) provided energy for the Industrial Revolution. The Enlightenment and modern empirical science promoted economic growth, as well as greater control over infectious disease. Positive feedback loops between science, technology, education, population expansion, and state power created the regime of modern growth. But the negative health feedbacks of modern growth have also been extreme and have shaped health disparities both within and between societies. Steamships and railroads fueled the circulation of deadly diseases, and over the last two centuries, as human numbers exploded, new diseases have emerged continuously. At the same time, scientific knowledge of infectious disease has grown, and the capacity of states to control threats to human health has vastly expanded too. Modernity is not a one-way street to human supremacy over nature, but a kind of escalating ratchet, in which humans have gained a remarkable but unstable advantage over an ever-growing number of parasites.

The distinctive human disease pool is thus a byproduct of our success as a species. And in turn, the trajectory of human history has been deeply influenced by the patterns of infectious disease. The population dynamics of other animals are shaped by their parasites, but there is nothing really comparable to the way that variations in the disease burden in space and time have imprinted on human history. This book tries to capture this two-way story. Our germs are a product of our history. And patterns of endemic disease (that is, a disease permanently established in a population) and epidemic disease (a disease that suddenly increases in prevalence, often with high mortality) have stamped our history.[7]

Infectious disease has shaped the course of human history in myriad ways. The most basic channel through which pathogens have shaped our past is demography, the population-level processes of birth, marriage, and death. Up to the twentieth century, most people died of infectious disease, so it is hard to overstate the relationship between patterns of infectious disease and the structures through which societies reproduce themselves. Mortality patterns shape fertility patterns, marriage systems, and educational investment. In turn, population dynamics affect everything from the incentives for technological innovation to the processes of state formation and decline. Beyond that, diseases have played a pervasive role in the power dynamics between societies. The history of disease has been integral to the history of war, migration, imperialism, and slavery. This book tries to bring a historical sensibility to these patterns, recognizing that, very often, both the distant and recent effects of infectious disease fold in upon one another in unpredictable ways.[8]

One of the major patterns of human history has been what we will call the paradox of progress. Very often, technological advance generates negative feedbacks for human health. From an ecological perspective, this pattern is not in fact paradoxical at all. Our success as a species has been a boon for our parasites, which are trying to accomplish the same biological ends as you or I: acquiring chemical energy that can be metabolized to do the work of replicating genetic information. The timescales of these negative feedbacks vary: sometimes they are slow and insidious, other times they come in the form of violent shocks. Populations absorb, respond, and adapt to these challenges in various ways. Human societies have always sought to understand and control their disease environments, and we should recognize that modern biomedical science and public health are dramatically successful extensions of humanity's long quest for good health.

To see this history in full requires us to operate on big scales—both geographically and chronologically. Inevitably there are tradeoffs in writing this kind of history. The book spans a few million years and covers the entire planet. It thus surrenders any pretext of adequate detail. The hope is that what is lost in granularity will be recouped in insight if we can start to see a little more clearly some of the broad patterns that have shaped the particular experience of different human societies. My own past work has focused on the history of the Roman Empire, which was struck by a series of deadly pandemics, one possibly caused by an ancestral form of the smallpox virus, another certainly caused by the bubonic plague. This work left me with a sense of big, important questions left unseen when we only zoom in, and never out. Why did the Roman Empire suffer giant pandemics at all? Why these diseases and why then?[9]

Such questions cannot be answered if we stay inside the usual lines. The history of disease simply does not conform to the way professional historians partition the past, along geographical and chronological boundaries. The history of human disease is a planetary story, and we try to keep a global perspective on health from start to finish. There is an analogue in the choice of which infectious diseases we choose to highlight. Sometimes histories of disease have been seduced by the drama of a few glamorous germs (like smallpox and plague). The allure is obvious, but such a view is blinkered. It represents the perspective of European societies looking back on a few dramatic chapters in the history of northern populations, a sort of latitudinal bias. Not only does such a narrative leave out the earthy reality of much of our struggle as a species—shaped by worms, biting bugs, dirty water, human and animal feces—it distorts the place of the great epidemics in history and makes them all the more difficult to understand.[10]

A planetary perspective also helps to untangle the relationship between disease and globalization. The term *globalization* is often used loosely; it calls to mind images of contemporary corporate capitalism in a borderless world. But globalization is more than that, and it too has a backstory. Globalization is a major theme in the history of disease, because transportation technologies and human movements have repeatedly intersected the evolution and transmission of infectious diseases. Seen from the perspective of planetary disease ecology, the history of globalization spans at least six distinct phases:[11]

- Prehistoric globalization. Starting around five thousand years ago, the domestication of the horse and invention of wheeled transport intensified long-range human connection and allowed more rapid dispersals of infectious disease.
- Iron Age globalization. From about three thousand years ago, the rise of massive territorial empires and the organization of transcontinental trade drew the societies of Asia, Europe, and Africa into regular contact.
- Peak Old-World globalization. Around one thousand years ago, prior to trans-Atlantic and trans-Pacific shipping, Europe, Asia, and Africa were linked by vibrant overland networks of exchange as well as by Indian Ocean commercial circuits.
- The Columbian Exchange. Just over five hundred years ago, long-distance sailing reconnected the hemispheres, marking the beginning of true planetary globalization.
- Fossil-energy transport. In the nineteenth century, steamships, trains, and automobiles started to release humans from dependence on foot, horse, and wind for transportation, leading to increases in trade, migration, and urbanization.
- The age of the jet plane. Over the last three generations, rapid airborne transportation has made distance virtually irrelevant as an epidemiological barrier.

It also needs to be stated at the beginning that this book is a history of infectious disease, which is not the same thing as a history of health. Human health is a multidimensional phenomenon, shaped by interrelated biological, social, and cultural factors. It is true that before the twentieth century, especially, infectious diseases were a primary determinant of human health, and they were always the leading cause of death. But nutrition, gender, social status, age, and other environmental factors affected patterns of health and disease, including infectious disease, in the past as they do now. It is also important to recognize that there is no ideal or entirely transparent way to measure human health, especially as we journey deeper into the past. Throughout the book I try to draw on a range of indicators that can help us understand the experience of health and the burden of disease: from skeletal records to estimates of crude death rates (a standard measure of how many people per one thousand die in a given year) to average life expectancies. To be sure, none of these are perfect ways to measure the more complex phenomena we are often striving to grasp, but they do offer us insights into changing patterns of health and disease that would otherwise remain hopelessly obscure.[12]

The final chapters of the book explore what the economist Angus Deaton has memorably called the Great Escape, the process in which modern societies became vastly more prosperous and in which the average human lifespan more than doubled. The control of infectious disease is a lynchpin of the Great Escape. Economic growth and dramatic reductions in the burden of infectious disease are deeply intertwined and ultimately share the same two root causes: the advance of scientific knowledge and the empowerment of states capable of protecting public health. This is a miraculous achievement. And yet, an ecological view of human history can add depth to a purely self-congratulatory narrative of progress. The negative feedbacks of growth have often been grim, especially for societies less prepared for the shock of new diseases. The homogenization of global disease pools in the age of steamships and railroads, paradoxically, contributed to enormous global divergence in wealth and health, creating gaps that have narrowed but still not been closed.[13]

We can see the control of infectious disease that we have achieved as part of a recent and novel experiment in human planetary domination. However, our dominance may be more tenuous than we would like to believe. For a moment in the mid-twentieth century, it seemed as though human progress would render infectious diseases a thing of the past. Emboldened by antibiotics, vaccination, and insecticides, our species went on the offensive. The smallpox virus, one of our cruelest enemies, was wiped off the face of the earth by a global health crusade. But progress stalled. The negative feedbacks of growth have continued to operate. New infectious diseases have continuously emerged. Old foes are developing resistance to antibiotics. Climate change is starting to upset ecological balances. We will never go back to the past, in which our ancestors were essentially helpless in the face of a threat they did not understand. But there is no guarantee that the extent of control we have achieved is permanent. Parasites adapt to the new environments we create, and unforeseen biological disruption has been, and continues to be, one of the great sources of instability in human civilization.

Evidence Old and New

There is a conspicuous reason why few historians since William McNeill, whose 1976 book *Plagues and Peoples* is a landmark and an inspiration, have tried to tackle the big history of infectious disease. Historians have an occupational attachment to evidence, especially written evidence: medical texts, government statistics, historical chronicles, and so forth. The further back we venture into the past, the thinner the record becomes, and the harder it is to use, especially if we are trying to determine what diseases really mattered. The challenge of retrospective diagnosis—identifying real diseases behind historical accounts of infection and sickness—is pervasive and profound. For example, until recently, historians hotly debated the biological agent of the Black Death, caused by a disease with a fairly distinct clinical presentation (bubonic plague, identifiable by the hard globes of pus that extrude from infected lymph nodes). This controversy highlights the serious challenge of understanding the biology of disease in former times.[14]

This book draws on a rich body of work in medical, environmental, and economic history that has helped us understand the role of infectious disease in the human past. But its claim to novelty rests in part on the effort to draw from a new source of knowledge: genomes. Genomes are the instructions encoded in the DNA (or, in the case of some viruses, RNA) of an organism. The code is written with molecular "letters"—long strands of nucleic acids—handed down from parents to offspring during reproduction (whether sexually, as with worms and some protozoa, or asexually, as with bacteria and viruses). These sequences are enormous in length. A human genome has three billion units (or base pairs); a viral genome might have tens or hundreds of thousands of base pairs, a bacterium a few million. Genome sequencing technologies are machines that take pieces of the DNA molecule and "read" the code, chemically deciphering the order of the letters that make up a strand of genetic material. Over the last decade or so, the speed of genome sequencing has increased, and its cost has tumbled, thanks to technologies known as high-throughput sequencing that can process millions of fragments of DNA simultaneously. Consequently, the amount of genetic data that has accumulated is staggering.[15]

Genomes are passed from generation to generation, with slight variations in the code that arise due to random mutations. These differences are a way to trace an organism's ancestry. In much the same way that your DNA, analyzed by a commercial ancestry company, can tell you certain facts about the population history of your forebears, the genomes of the microbes that infect us hold important clues to their past. The mountains of genetic data that are piling up thus constitute a potentially massive archive of evolutionary history. Chapter 1 further explores the implications of this new evidence, but suffice it to mention here two ways that high-throughput sequencing has been transformative. First, it has dramatically expanded the potential of genome-based *phylogenetics*, or the study of evolutionary family trees. Second, it undergirds the growing field of *paleogenomics*, which analyzes fragments of ancient DNA recovered from archaeological samples. These terms are a mouthful, and we can call them, colloquially, "tree thinking" (phylogenetics) and "time travel" (paleogenomics). Tree thinking will help us understand the evolutionary history of our germs: how old they are, where they came from, who their relatives are, and so forth. Time travel, when it is possible, lets us know what pathogens made our ancestors sick at specific points in the human past.[16]

This new evidence is exhilarating, but, as always, the rush of fresh information brings its own kinds of uncertainties; often the most impressive thing we learn is the breadth of our ignorance. This is more than the conventional gesture of intellectual humility or academic hedging of bets. The sheer novelty of the methods, and the rapid pace at which they are moving, mean that every month brings important new evidence and insights, revised chronologies and geographies of disease. Paleogenomics and genome-based phylogenetics are fields on the move. What we think now may seem obsolete in the near future. That is all to the good. Thucydides wrote his famous history as a "possession for all time." Our aims are rather more circumscribed. It will be enough to explore how these new kinds of evidence are starting to deepen our understanding of the relationship between human history and pathogen evolution.

This book aspires to practice what the biologist E. O. Wilson called consilience, the joining together of knowledge from different domains to form a unified explanation. It is a work of history that draws heavily from both biology and economics. It tries to weave together the social sciences and natural sciences, but its concerns are resolutely humanistic. The history of infectious disease can teach us about who we really are. We are primates—clever, voracious primates—who have taken over the planet, and, like any organism, we have parasites that constantly evolve in response to the circumstances we present them. This history reminds us that we are one species whose health is ultimately indivisible. When I started this project, I had hoped that a new history of infectious disease might encourage us to appreciate the dangers we still face collectively. COVID-19, of course, has changed the stakes and made it self-evident that infectious diseases retain the capacity to upend our lives. We know we are living through something historic, and at times it can feel like we are living in history, in the past. The story of disease can help us understand how we came to be where we are, and possibly help us decide where we want to go.[17]

INDEX